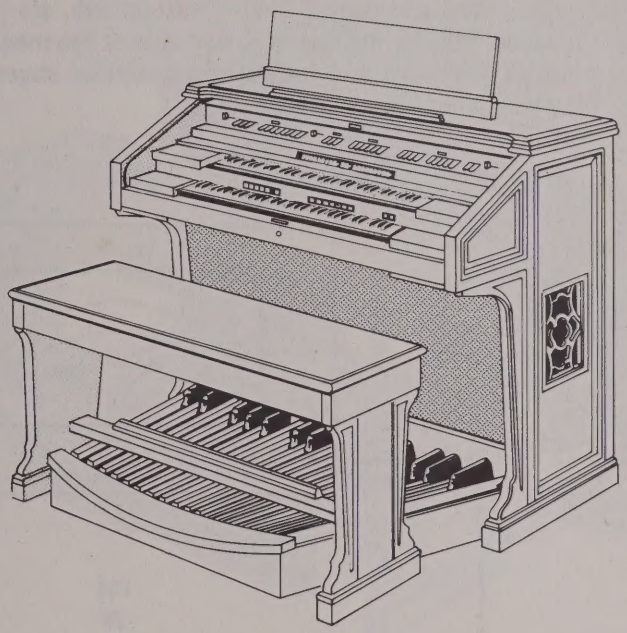
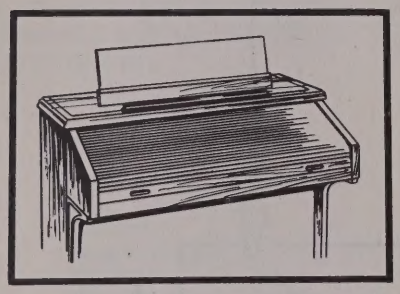
SERVICE MANUAL

Console 820100





CAUTION

SEE SAFETY NOTICE ON INSIDE COVER SHEET

H000-006140

HAMMOND ORGAN COMPANY

A DIVISION OF MARMON COMPANY

A MEMBER OF THE MARMON GROUP OF COMPANIES

4200 W. Diversey Avenue ° Chicago, Illinois 60639

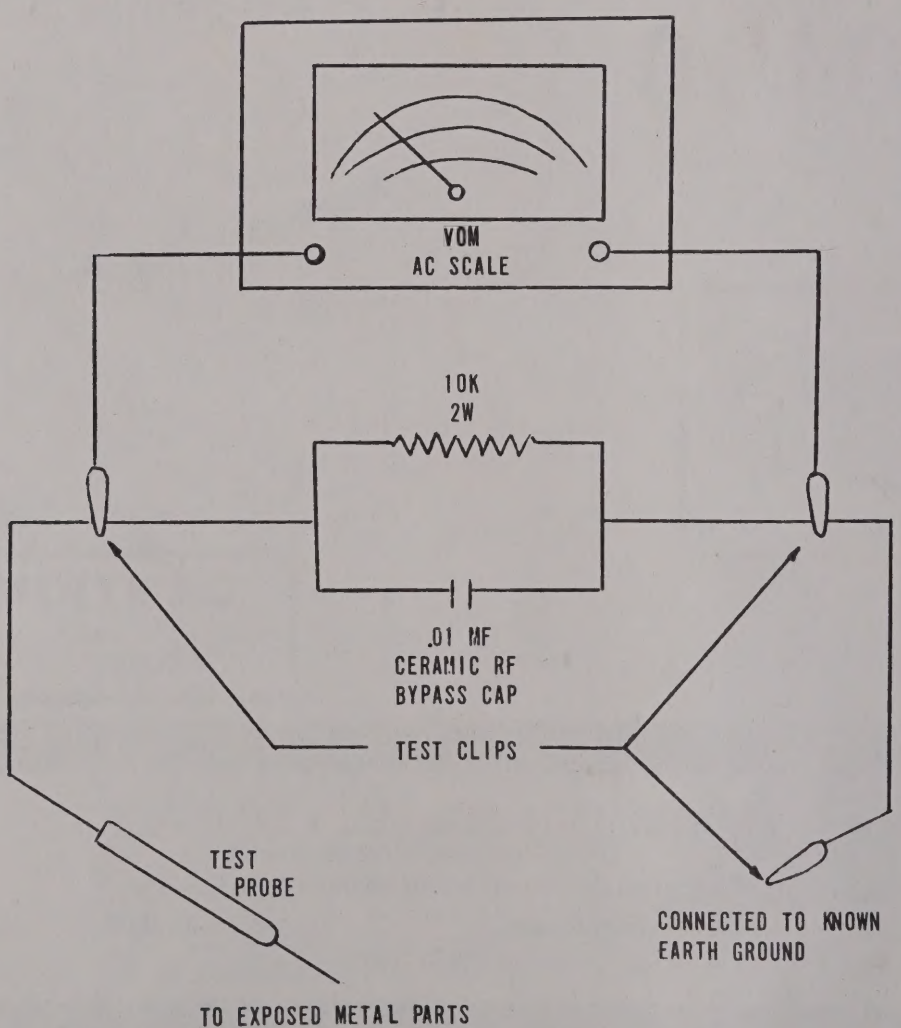
[312] 283-2000

SAFETY NOTICE

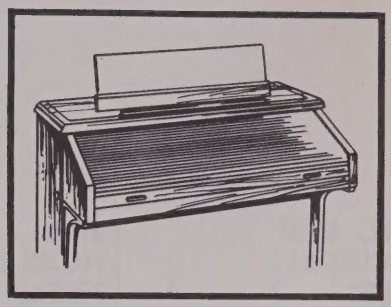
Great care has been taken in the design and manufacture of this product to assure that no shock hazard exists on any exposed metal parts. Internal service operations can expose the technician to hazardous line voltages and accidentally cause these voltages to appear on exposed metal parts during repair or reassembly of product components. To prevent this, work on these products should only be performed by those who are thoroughly familiar with the precautions necessary when working on this type of equipment.

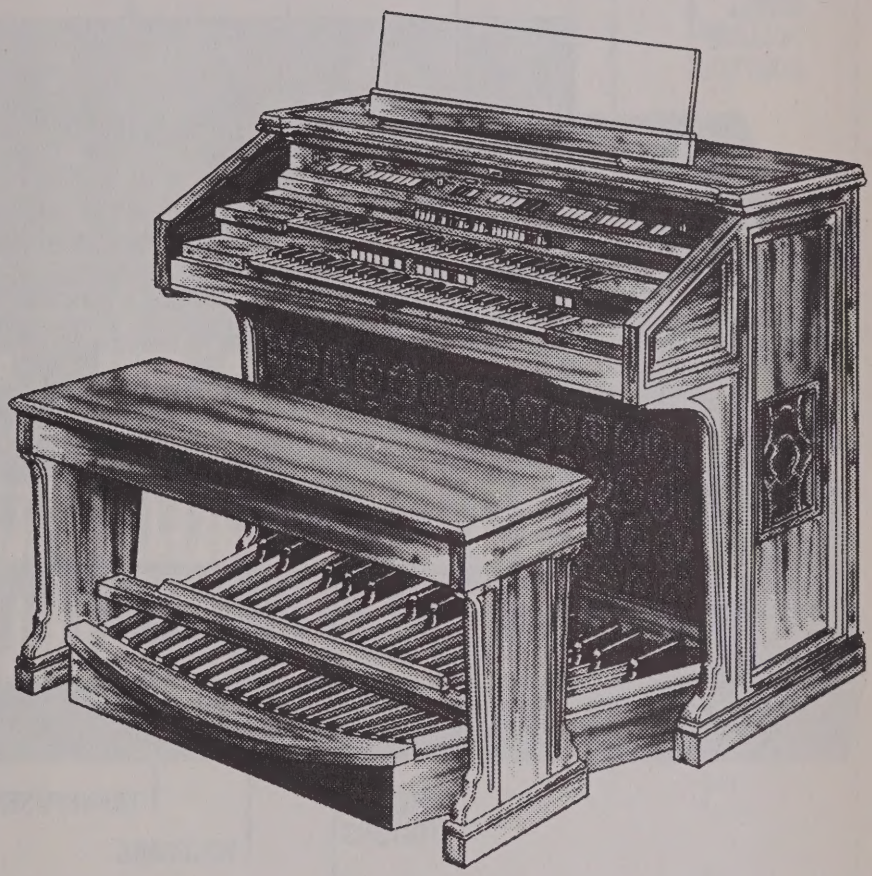
To protect the user, it is required that all enclosure parts and safety interlocks be restored to their original condition and the following tests be performed before returning the product to the owner after any service operation.

Plug the AC line cord directly into a line voltage AC receptacle (do not use an isolation transformer for this test) and turn the product on. Connect the network (as shown below) in series with all exposed metal parts and a known earth ground such as a water pipe or conduit. Use an AC VOM of 5,000 ohms per volt or higher sensitivity to measure the voltage drop across the network. Move the network connection to each exposed metal part (metal chassis, screw heads, knobs and control shafts, escutcheon, etc.) and measure the voltage drop across the network. Reverse the line plug and repeat the measurements. Any reading of 4 volts RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the product to the user.



The HAMMOND Console 820100





Hammond presents a new musical masterpiece: the magnificence of authentic pipe-like sound...combined with the versatility of exclusive Hammond Tonebars. Both these outstanding musical qualities come together in the incomparable Hammond 820!

The dazzling sound qualities of the Model 820 combine with a 32-note AGO concave radiating pedalboard and two 61-note overhanging manuals to create the ultimate instrument for the serious student of organ literature...providing inspiring performances even under the most demanding spotlight. The 820...detailed quality and the finest workmanship synonymous with the name Hammond.

Swell

Principal	16′
Geigen Principal	8′
Salicional	8′
Spitz Principal	4′
Trompette	8′
Oboe	8′
Vox Humana	8′
Clarion	4′

Swell Sustain
Harp Solo
Chime Solo
Piano Solo

Tonebars

16′
5-1/3′
8′
4′
2-2/3′
2′
1-3/5′
1-1/3′
1′

Great

Principal	8′
Octave	4′
Trumpet	8′
Clarion	4′
Great to Great	4′

Great Sustain

Tonebars

16′
5-1/3′
8′
4′
2-2/3′
2′
1-3/5′
1-1/3′
1′

Pedal

Great to Pedal
Pedal Sustain
Pedal Mute

Tonebars

16′
8′

General

Leslie Swell
Leslie Great
Leslie Chorale
Leslie on Reverb

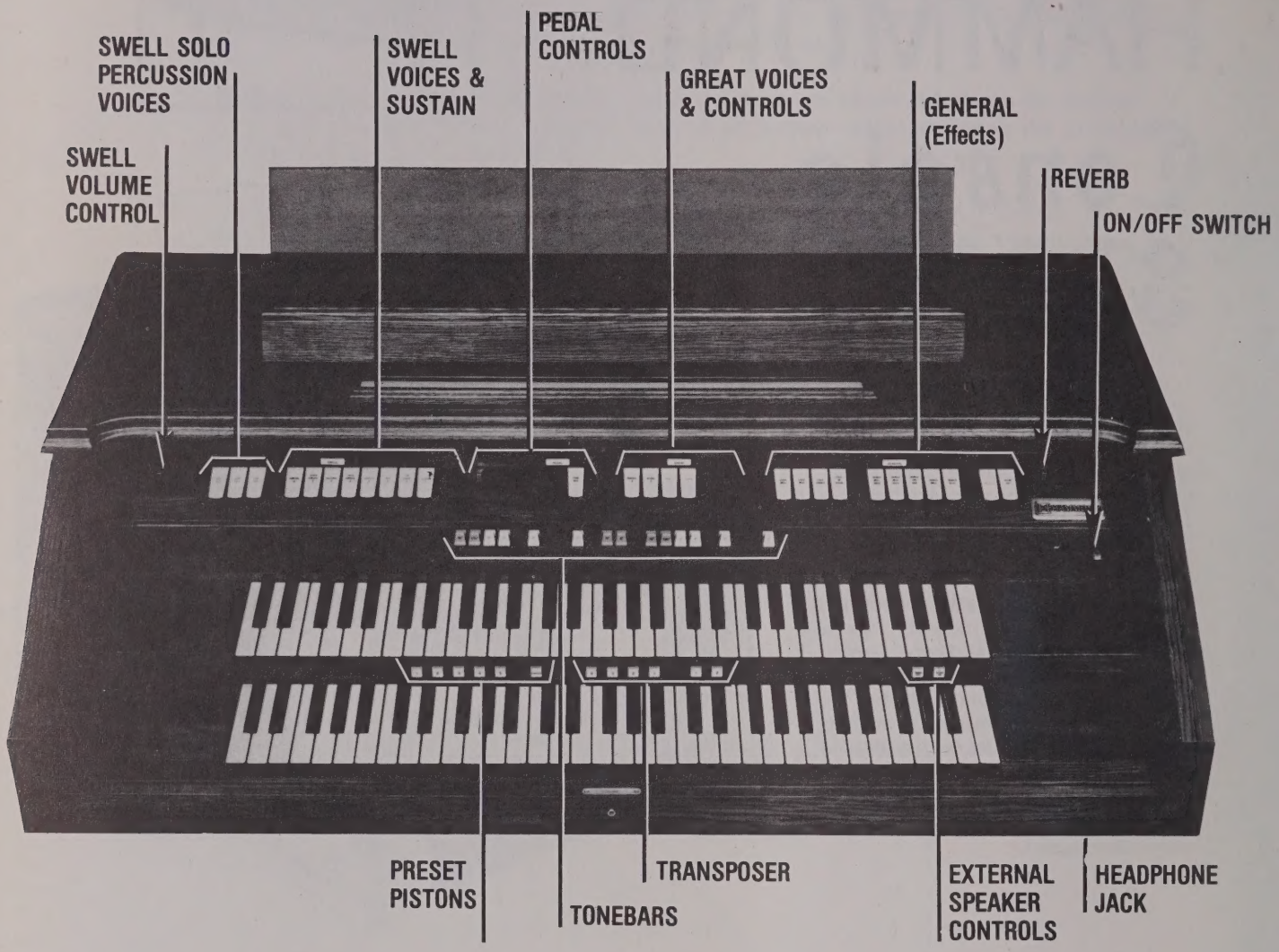
Tremolo-Swell Voices
Tremolo-Great Voices
Tremolo-Tonebars
Tremolo Small
Tremolo Delay

Brilliance
Volume Soft

Stereo Headphone Jack
Auxiliary Input Jack
Roll-Top Cover
Remote Tone Cabinet Socket
Main On, Echo Off
Built-In Speakers
1-15″, 1-6″ and
1-6″ x 9″ Leslie
Power Amplifiers
2-35 Watt
Dimensions
52″ L, 43″ H (52″ with
music rack up), 29″ D
Weight
430 lbs. (including bench
and pedalboard)

Sliders

Swell Level
Pedal Sustain
Reverb



CONTROLS LAYOUT 820100

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SECTION I
HOW THE ORGAN OPERATES

GENERATOR SYSTEM

Tone generation is achieved on the Model 820165 organ by using a six channel 440 Multiplex system for tonebar pitches, Swell Percussion, Swell Voices, Great Voices, and Pedals. The instrument contains the equivalent of six independently keyed tone sources. In order to facilitate playability and feature selection, a set of priorities has been established.

1. Swell Manual (Upper Keyboard)

   a. Tonebar tones and tab voices play except when solo presets or pistons are activated.

   b. Tab voices and all tonebar tones are additive.

   c. Sustain is simultaneously applied to tonebar tones and tab voices.

   d. The solo voice priority is: PIANO SOLO, CHIME SOLO, HARP SOLO

   e. Organ pistons have priority over all divisions including solo voices.

2. Great Manual (Lower Keyboard)

   a. Tab voices and all tonebar tones are additive.

   b. Sustain is simultaneously applied to tonebar tones and tab voices.

   c. GREAT TO GREAT 4' coupler can be operated whenever a tab voice is on.

   d. Organ Pistons have priority over all voice divisions.

3. Pedals

   a. 16' and 8' Pedal tones are additive.

   b. PEDAL SUSTAIN affects 16' and 8' Pedal pitches and coupled Great tones.

   c. Pistons have priority over all Pedal voices.

   d. GREAT TO PEDAL coupler can be used at all times.

PERCUSSION AND TAB VOICES

The Swell Manual has three solo percussion voices which take priority over all other Swell divisions. The PIANO SOLO, CHIME SOLO and HARP SOLO voices along with the eight traditional organ tab voices are controlled in level by the SWELL LEVEL control on the left side of the control panel. The organ tab voices are PRINCIPAL 16', GEIGEN PRINCIPAL 8', SALICIONAL 8', SPITZ PRINCIPAL 4', TROMPETTE 8', OBOE 8', VOX HUMANA 8', and CLARION 4'.

The great manual has four traditional organ tabs; PRINCIPAL 8', OCTAVE 4', TRUMPET 8', and CLARION 4'.

PEDALS

The Model 820165 uses a 32 note radiating pedal clavier. The two voices, 8' and 16', are polyphonic additive voices. An additional range of pedal tonality is provided by a GREAT TO PEDAL coupler and a PEDAL MUTE tab control.

PISTONS

Five numbered preset pistons are located between the Swell and Great Manuals. The piston controls numbered 1 thru 5 are monentary push buttons, lighted when on, and a cancel button, C, not lighted. Each piston presets a complete registration for the Swell, Great and Pedal Manuals.

The fullness of preset registrations is programmed sequentially according to the numbered pistons. Preset 1 is the softest registration, whereas preset 5 is the fullest. Two or three pistons may be combined by pushing the desired buttons simultaneously.

General effects including animation tabs, PEDAL MUTE, PEDAL SUSTAIN, GREAT TO PEDAL, VOLUME SOFT, and BRILLIANCE are not affected by the pistons. The selective performance preset on the pistons is shown in Table 1 at the end of this section.

ANIMATION

The Model 820165 uses a two speed Leslie Rotosonic unit. There is manual separation provided so that Swell and Great Manuals may be independently animated by the Leslie. A LESLIE ON REVERB option tab is provided.

The percussion division, pedals, and tab voices are always channeled through the main amplifier. One exception to this statement is VOX HUMANA 8', which is controlled by the LESLIE SWELL control tab.

Tremolo is an effect that adds a wavering, pulsating motion to organ voices and tonebars which are being channeled through the main amplifier and speaker. This animation is also called vibrato. Tremolo animation is available in two depths and delayed. It is also selective in that the affect can be individually controlled for the Swell Voices, Great Voices, and tonebars. Animation does not affect Pedal tonebar registrations unless the TREMOLO TONEBARS tab and the GREAT TO PEDAL tab are both selected.

TRANSPOSER

The TRANSPOSER control section is located to the right of the preset piston between the two keyboards. The transposer features a transposition range of two half steps up and four half steps down. Control means is achieved by momentary lighted push buttons similar to the preset pistons.

When no buttons are lighted, the key in which the organ will sound is normal 440 pitch. When a numbered button is pushed or selected, it will light and remain lighted until another number is selected or the black button is touched, returning the pitch to normal 440.

REVERBERATION

An Accutronics Type IX reverb unit is used to provide this feature. The degree of reverb is controlled by a slider pot mounted on the right side of the control panel.

AUDIO SYSTEM

The basic audio system consists of two 35 watt amplifiers. The main channel amplifier powers a 15 inch woofer and a 6 inch tweeter. The second 35 watt amplifier feeds the two speed Leslie rotating speaker channel with a 6 X 9 inch speaker.

AUXILIARY CONNECTIONS

Provisions are made for an auxiliary audio input and headphones. Both of these connections are made by 1/4 inch phone jacks, and are located under the manual shelf on the right side of the organ. The auxiliary input is under expression control and designed to have an impedance of 47,000 ohms and produce full output with a 1/4 volt input signal.

The headphone jack is wired to perform properly with either mono or stereo phones without adapters. All organ speakers go silent when the headphone plug is connected.

LIGHTING

The Model 820165 incorporates a music desk, control panel, and pedal lights. All lights except pedal lights are controlled by the organ power switch, thus the lights will always be lit when the organ power is "ON".

REMOTE TONE CABINET SOCKET

Located on the lower back of the organ is an eleven pin socket designed to accept a Leslie self powered, 2 channel tone cabinet plug. The Leslie Speaker Model 715C (furniture style, matching oak finish) is recommended.

Two lighted monentary push buttons located between the manuals and labeled MAIN OFF and ECHO ON, control external speaker(s). (NOTE: These switches function and light only when tone cabinet(s) is connected).

TABLE 1

MODEL 820165 COMBINATION PISTONS

PISTON	SWELL	GREAT	PEDAL
1	Vox Humana 8'		
	00 0400 000	00 5005 000	50
2	Salicional 8'		
	00 3303 234	00 4402 011	44
3	Principal 8' & 4'	Principal 8'	
	Salicional 8'		
	00 7505 234	00 5504 002	56
4	64 8888 088	00 7747 046	75
5	Principal 16'-8'-4'	Principal 8'	
	Salicional 8'	Octave 4'	
	Clarion 4'	Great to Great 4'	
	60 8876 544	10 8705 005	75

NOTES

a. Cancel returns organ to normal tab and tonebar operation.

b. Pistons will not affect animation tabs, PEDAL MUTE, PEDAL SUSTAIN, GREAT TO PEDAL, VOLUME SOFT, or BRILLIANCE.

c. SWELL LEVEL slider control functions at all times.

SECTION III
DISASSEMBLY PROCEDURE

TO REMOVE REAR COVER

1) Disconnect organ from A.C. line voltage source.

2) Remove eleven phillips head screws from rear cover.

3) Pull the cover gently up and away from organ.

TO REMOVE ROLL TOP

1) Follow steps to remove rear cover.

2) With roll top in the closed position, remove two 5/16" hex head screws from right and left side stop blocks, as shown in Figure A Number 1 and remove stop blocks.

3) Disconnect music lights by unplugging P1 located under the top panel assembly, as shown in Figure A Number 2.

4) Slide roll top back, guiding it out of the organ, as shown in Figure A Number 3.

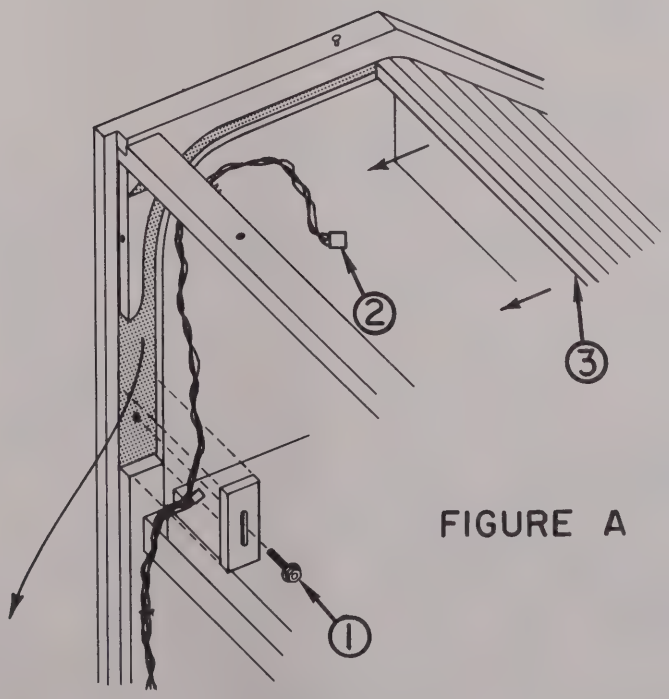


FIGURE A

TO REMOVE TOP PANEL ASSEMBLY

1) Follow steps to remove roll top.

2) Note: Music light connector P1 has been disconnected in removal of the roll top, step 3.

3) Remove two 1/4" hex head screws from both right and left sides of the top rail, as shown in Figure B Number 1.

4) Slide top panel towards the front of the organ, approximately 1/2", as shown in Figure B Number 2.

5) Gently lift the top panel up and away from the organ, as shown in Figure B Number 3.
Note: The top panel should not be forced upward. If resistance is encountered while lifting, the assembly should be pushed slightly backward and/or sideways until free lifting is possible.

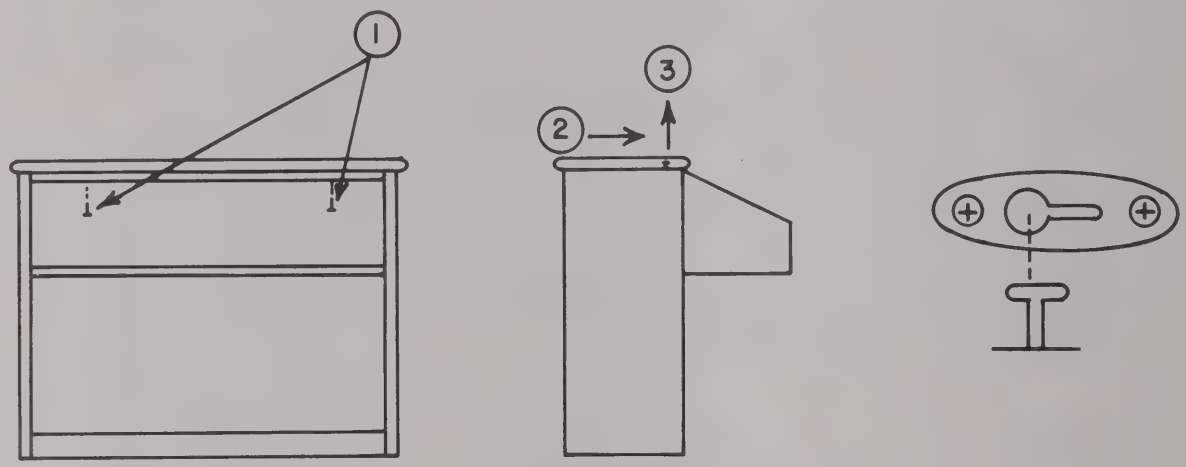


FIGURE B

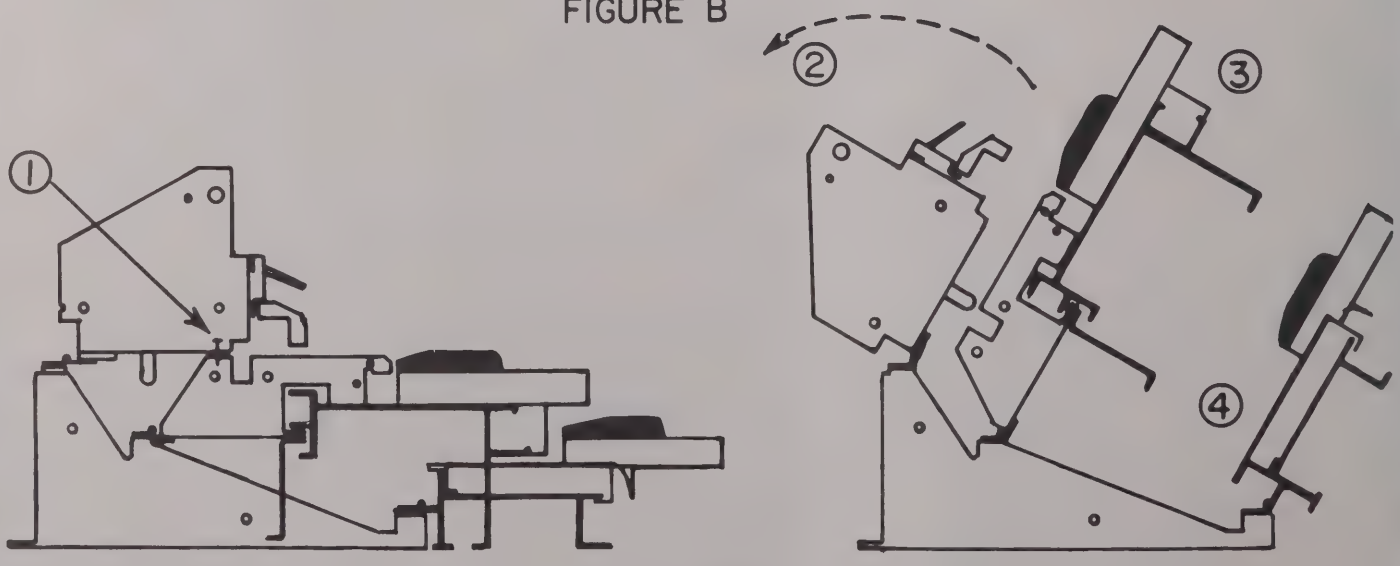


FIGURE C

TO SWING BACK CONTROL PANEL ASSEMBLY

1) Follow steps to remove top panel assembly.

2) Remove two 1/4" hex head screws from right and left side brackets, as shown in Figure C Number 1.

3) Grasp the control panel at each end from the front of the organ and tilt backwards, as shown in Figure C Number 2.

CAUTION: THE CONTROL PANEL MUST BE FIRMLY SECURED WHEN PLACED IN THE UPRIGHT POSITION, OTHERWISE IT MAY FALL, CAUSING DAMAGE TO ORGAN PARTS OR PERSONAL INJURY.

TO SWING BACK UPPER MANUAL ASSEMBLY

1) Follow steps to swing back control panel assembly.

2) Remove two 7/16" hex head bolts from underneath the organ shelf, as shown in Figure D Number 1.

3) Grasp the upper manual at each end from the front of the organ and tilt backwards, as shown in Figure C Number 3.

CAUTION: THE UPPER MANUAL MUST BE FIRMLY SECURED WHEN PLACED IN THE UPRIGHT POSITION, OTHERWISE IT MAY FALL, CAUSING DAMAGE TO ORGAN PARTS OR PERSONAL INJURY.

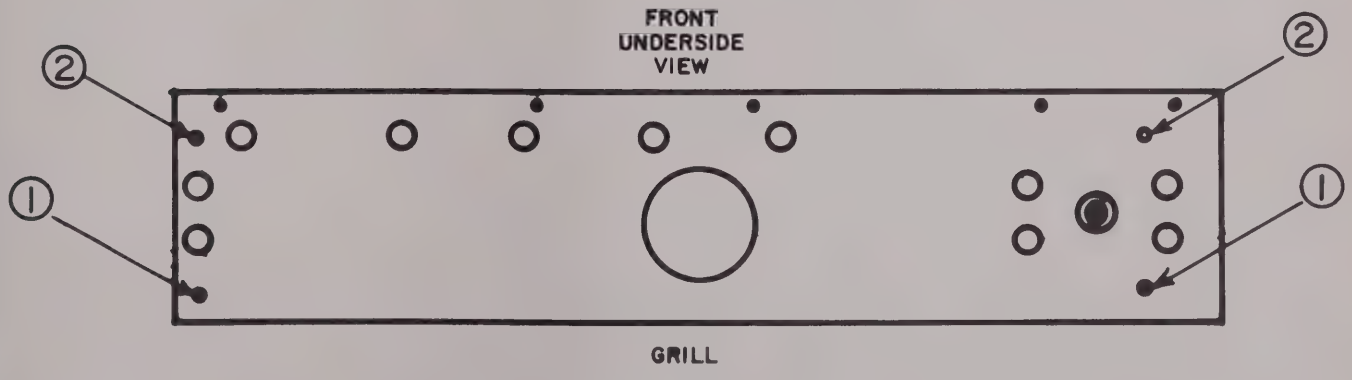


FIGURE D

TO SWING BACK LOWER MANUAL ASSEMBLY

1) Follow steps to swing back upper manual assembly.

2) Remove two 3/8" hex head bolts from underneath the organ shelf, as shown in Figure D Number 2.

3) Grasp the lower manual at each end from the front of the organ and tilt backwards, as shown in Figure C Number 4.

CAUTION: THE LOWER MANUAL MUST BE FIRMLY SECURED WHEN PLACED IN THE UPRIGHT POSITION, OTHERWISE IT MAY FALL, CAUSING DAMAGE TO ORGAN PARTS OR PERSONAL INJURY.

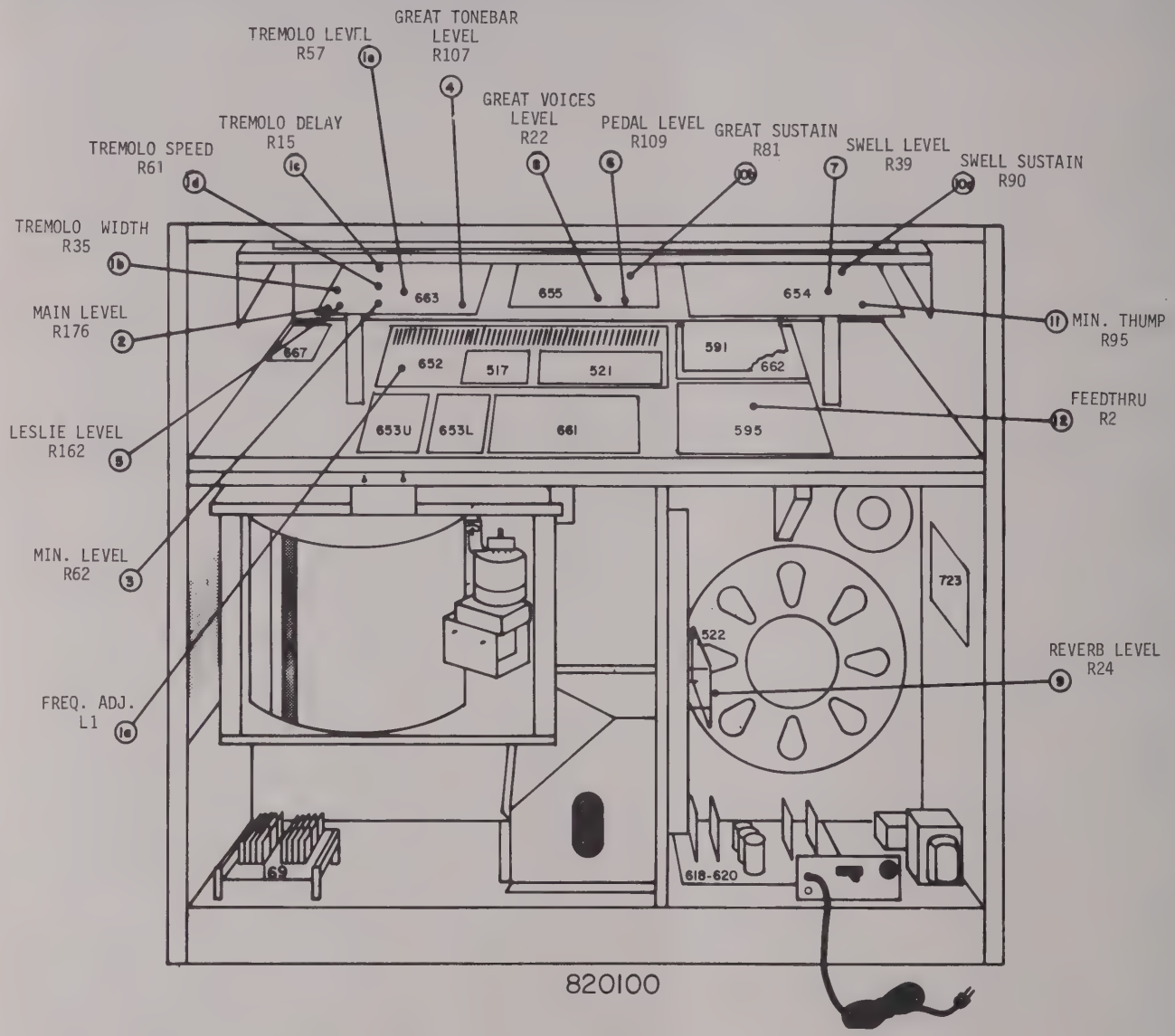
TO REMOVE PEDAL ASSEMBLY

1) Slide pedal clavier out from the front of the organ approximately 6"

2) Disconnect two keying cable plugs.

3) Continue sliding pedals out until clear.

SECTION IV
TEST AND ADJUSTMENT PROCEDURE


TREMOLO LEVEL R57
1a
GREAT TONEBAR LEVEL R107
4
GREAT VOICES LEVEL R22
8
PEDAL LEVEL R109
9
GREAT SUSTAIN R81
10a
SWELL LEVEL R39
7
SWELL SUSTAIN R90
10c
TREMOLO DELAY R15
1c
TREMOLO SPEED R61
1d
TREMOLO WIDTH R35
1b
MAIN LEVEL R176
2
LESLIE LEVEL R162
5
MIN. LEVEL R62
3
FREQ. ADJ. L1
1e
MIN. THUMP R95
11
FEEDTHRU R2
12
REVERB LEVEL R24
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663
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653U
653L
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618-620
820100

TEST AND ADJUSTMENT PROCEDURE

MODEL 820100

STEP	TITLE OF TEST	SETUP PROCEDURE (TABS DEPRESSED) (TONEBARS OUT)	KEY(S) DEPRESSED	SCALE & TYPE OF TEST EQUIP.	TEST POINT	POT AND BOARD	SPECIFICATION AND/OR ACCEPTABLE CONDITION
1	Frequency & Tremolo	a) Swell 4' Tonebar		Freq. Counter	J543 Pin 4	Tuning Coil 124-652	a) 3136 ± 4Hz
		b) Tremolo Delay	Play any Swell Key	Freq. Counter	IC6 Pin 3 or 4	124-663 R35	b) 430 KHz ± 1% Tremolo Width
		c) Tremolo Delay	Key 25	Scope 2 V Div.		124-663 R15	c) Adjust Tremolo Delay for .8 seconds
		d)			IC 7 pin 7	124-663 R61	d) 152 ms Tremolo Speed
		e) Tremolo on Tonebar Swell Tonebar 008808008	25,29,32		Main Spkr	124-663 R57	e) 3.5V RMS
2	Main Level	Swell Tonebar 008808008	25,29,32		Main Spkr	124-663 R176	3.5V RMS
3	Minimum Level	Min. Swell 008808008	25,29,32		Main Spkr	124-663 R62	160mV (RMS)
4	Great Level Tonebar	Great Tonebar 008808008	25,29,32		Main Spkr	124-663 R107	3.5V RMS
5	Leslie Level	U/M Tonebar 00088008 Leslie Swell Tab	U/M 25,29,32		Leslie Speaker	R162 124-663	5.0 RMS
6	Pedal Level	Pedal Tonebar 88	13		Main Speaker	R109 124-665	8.0 RMS
7	Swell Level	Principal 16' Geigen Principal 8' Spitz Principal 4'	Swell 25,29,32		Main Speaker	R39 124-654	2.2V RMS
8	Great Voices Level	Principal 8' Octave 4'	Great 25,29,32		Main Speaker	R22 124-655	.2V RMS

TEST AND ADJUSTMENT PROCEDURE

MODEL 820100

STEP	TITLE OF TEST	SETUP PROCEDURE (TABS DEPRESSED) (TONEBARS OUT)	KEY(S) DEPRESSED	SCALE & TYPE OF TEST EQUIP.	TEST POINT	POT AND BOARD	SPECIFICATION AND/OR ACCEPTABLE CONDITION
9	Reverb	Leslie Swell 000607080	25,26,27 28,29		Main Speaker		1.2V RMS
10	Sustain	a) Swell Sustain Tab Swell 8' tonebar	Key 25 Repeated-ly		Main Speaker	R90 124-654	Adjust R90 for maximum decay time
		b) Great Sustain Tab Great 8' tonebar	Key 25 Repeated-ly		Main Speaker	R81 124-665	Adjust R81 for maximum decay time
11	Minimum Thump	Vox Humana 8' only	Swell Key 61 repeated-ly		Main Speaker	R95 124-654	Adjust R95 for minimum keying thump
12	Feedthru	All Swell tonebars position 8			Main Speaker	R2 124-595	Adjust R2 for minimum feedthru
13	Hum and Noise	Leslie Chorale		RMS VM 30 MV	Main Speaker		10 MV Max Swell
				"	Leslie Speaker		7 MV Max Swell

SECTION V
PWB SCHEMATICS AND LAYOUTS

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(715) (719) (720)	Keyer P.W.B.'s Schematics & Layouts	124-000715,719,720	5-29
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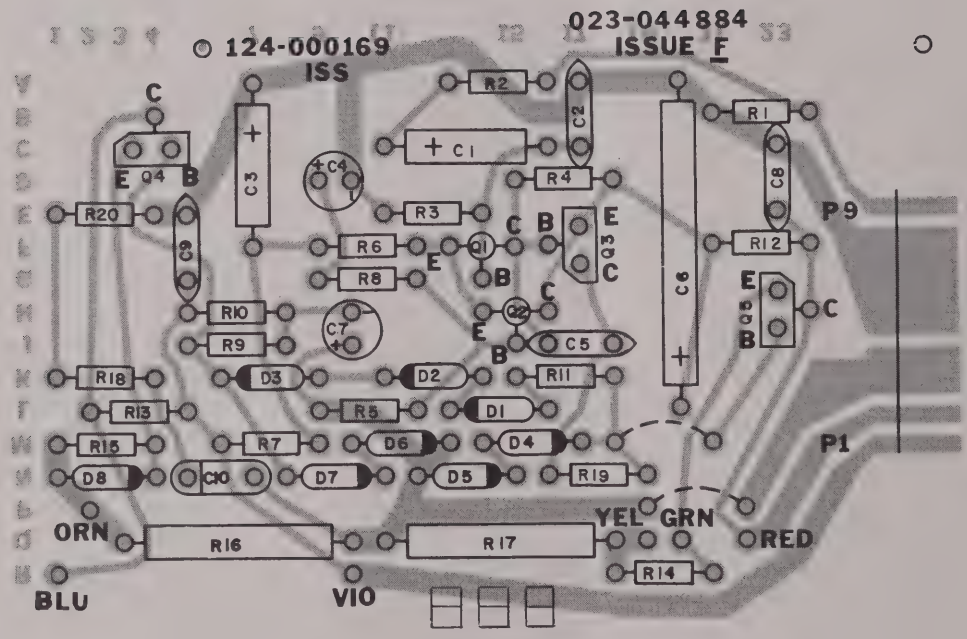
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+ C1
R4
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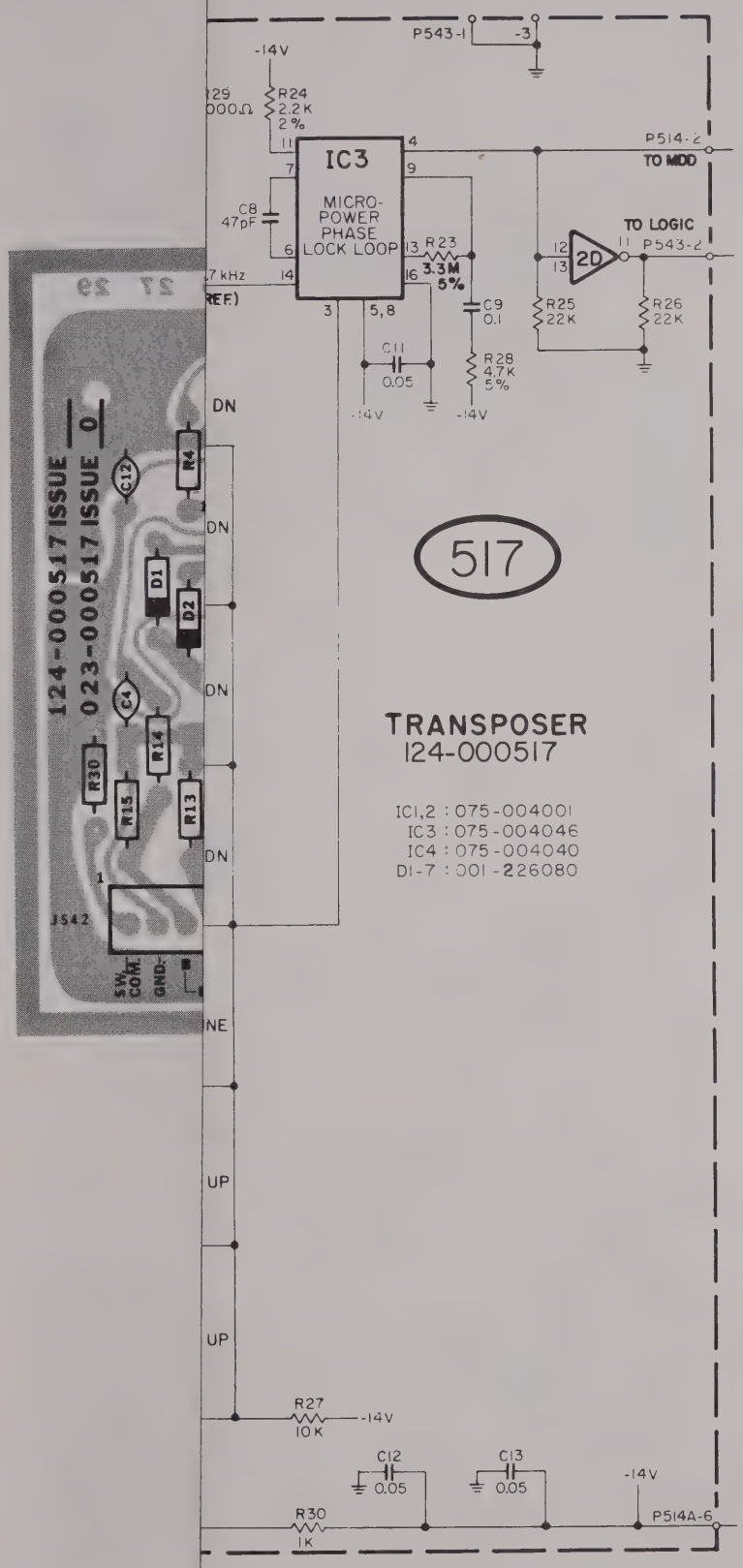
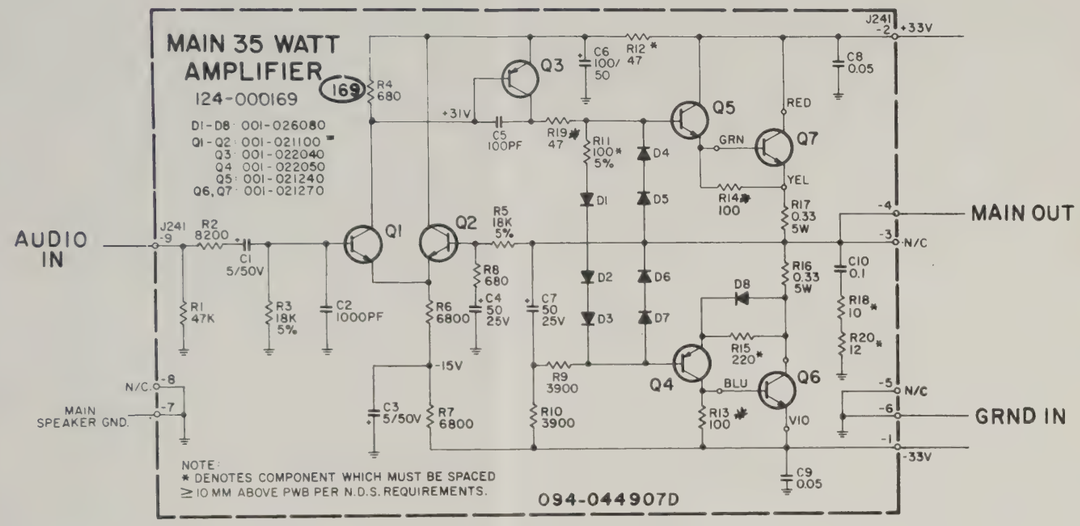
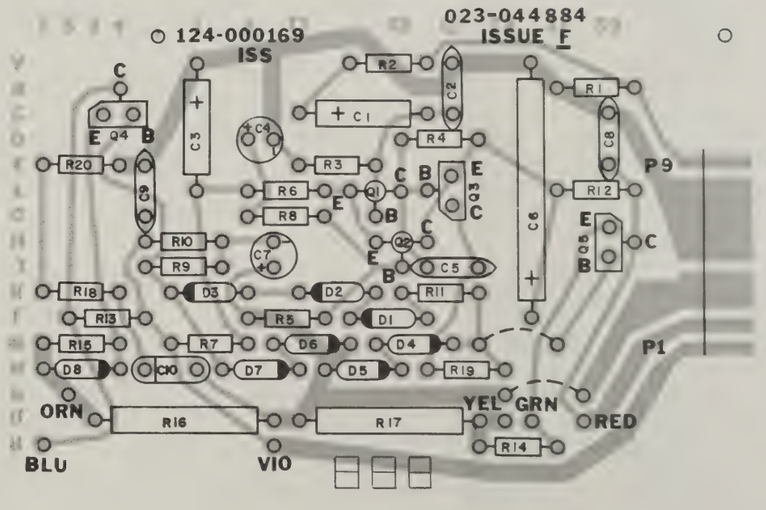
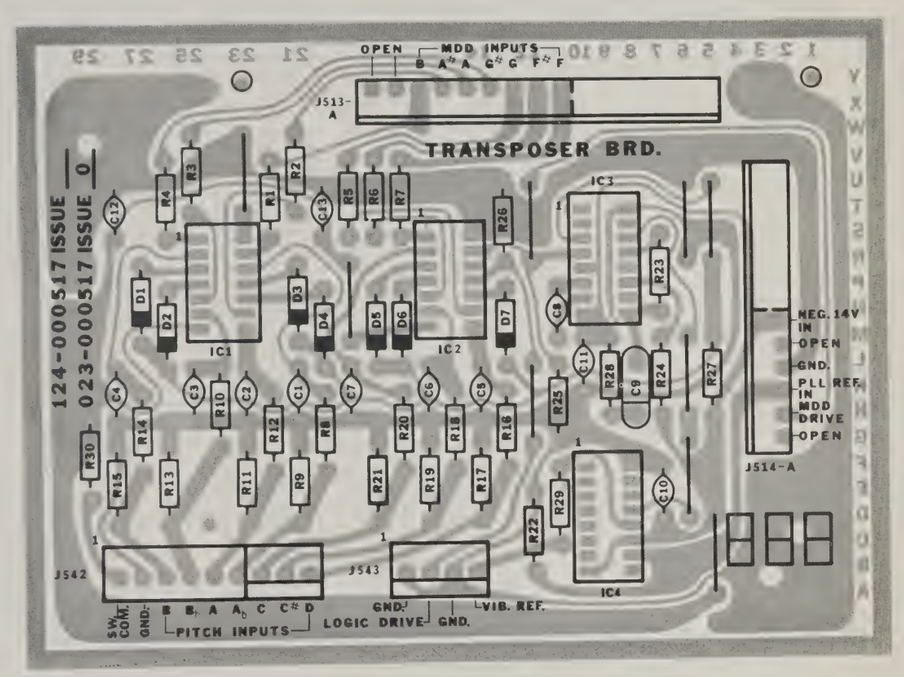


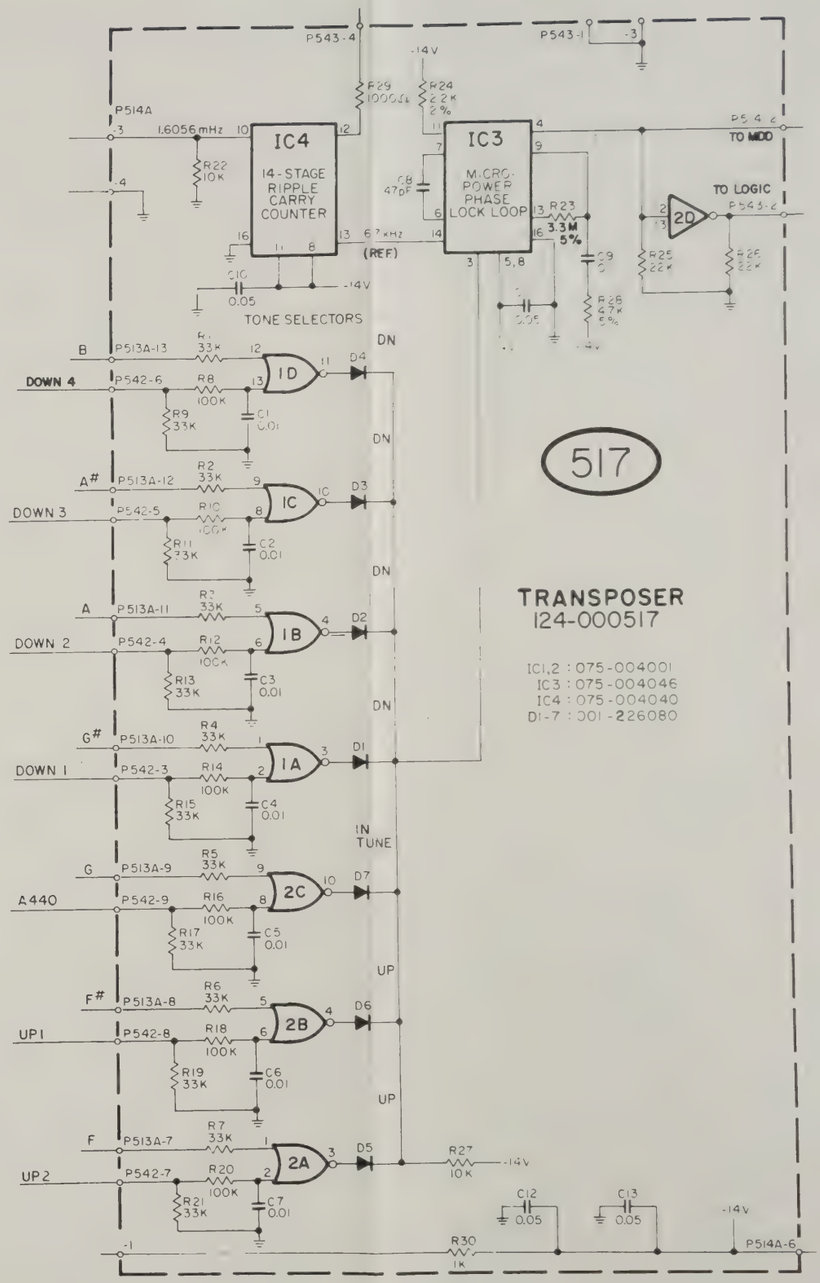
TRANSPOSER
SCHEMATIC
COPPER & LEGEND
124-000517



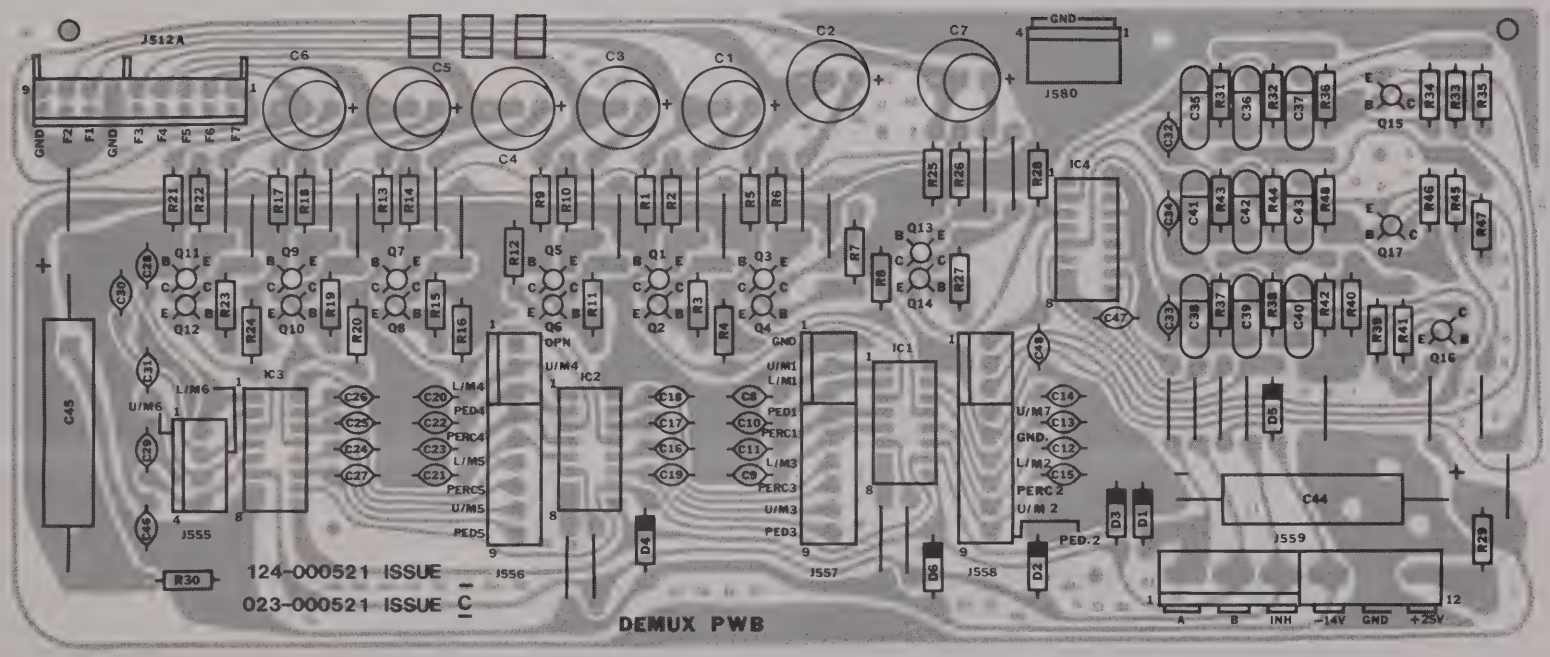


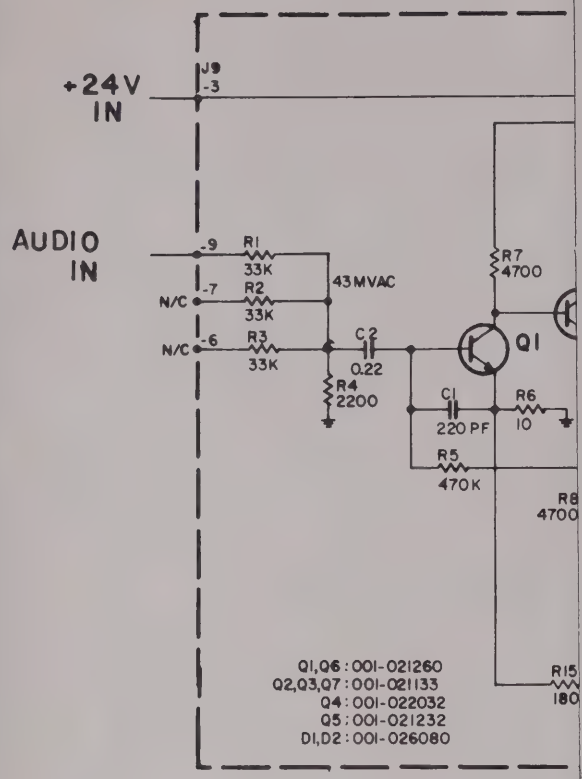
35 WATT POWER AMP
SCHEMATIC
COPPER & LEGEND
124-000169

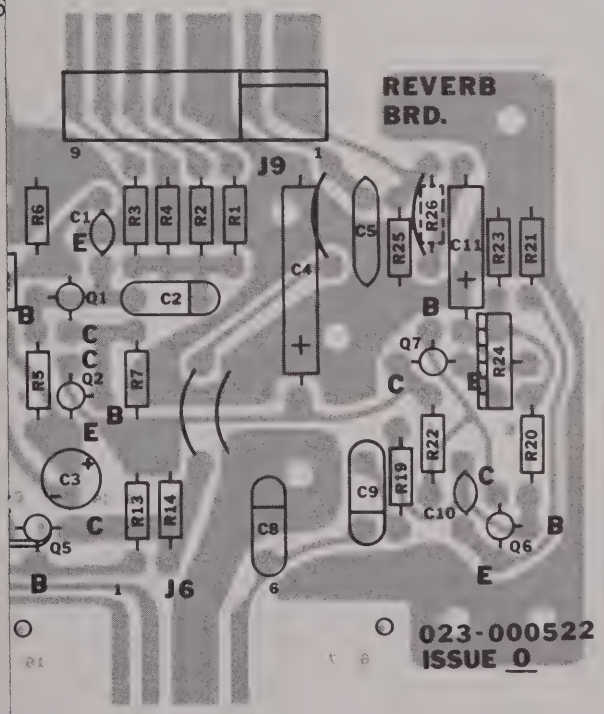




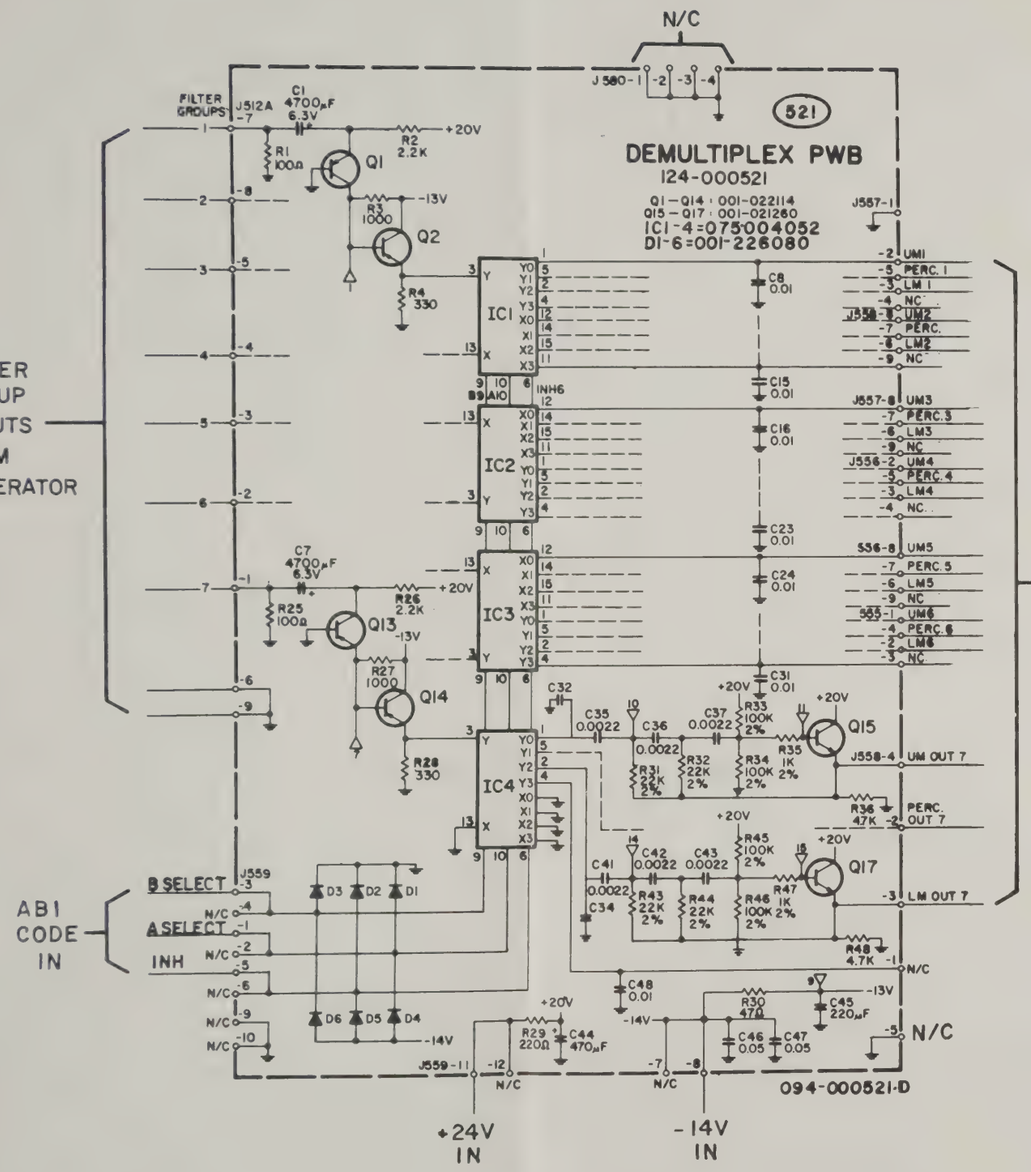
TRANSPOSER
SCHEMATIC
COPPER & LEGEND
124-000517

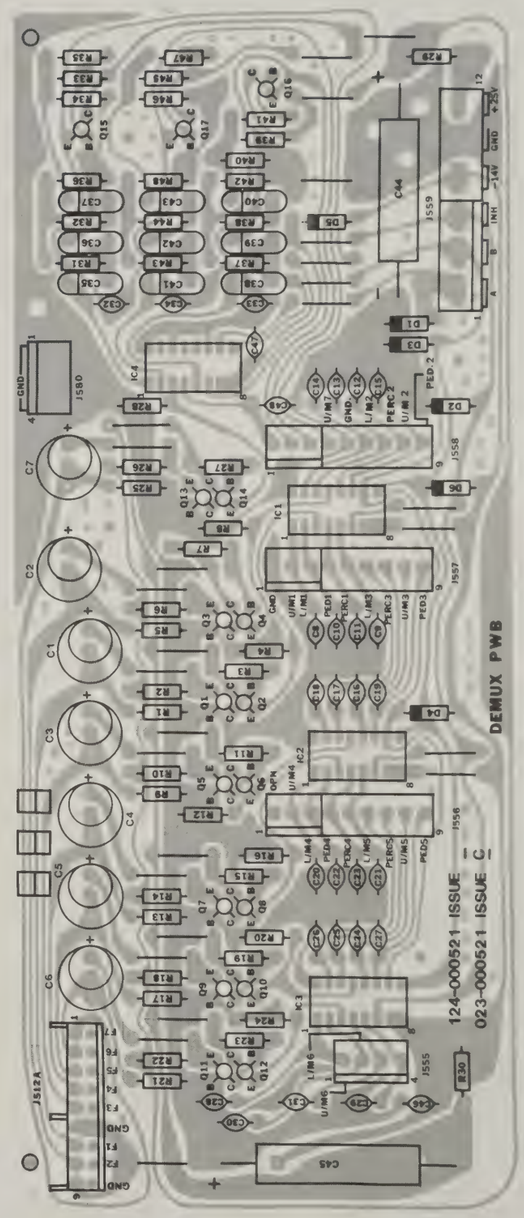

J512A
GND F2 F1 GND F3 F4 F5 F6 F7
C6
C5
C4
C3
C1
C2
C7
GND
J580
R21 R22 R17 R18 R13 R14 R9 R10 R1 R2 R5 R6
R25 R26 R28
IC4
C35 R31 C36 R32 C37 R36
Q15
R34 R33 R35
C32
C41 R43 C42 R44 C43 R48
Q17
R46 R45 R47
C38 R37 C39 R38 C40 R42 R40
R39 R41
Q16
Q11 Q12 Q9 Q10 Q7 Q8 Q5 Q6 Q1 Q2 Q3 Q4 Q13 Q14
R23 R24 R19 R20 R15 R16 R12 R11 R3 R4 R7 R8 R27
C28 C30 C31 C29 C46
C45
IC3
L/M6 U/M6
J555
C26 C25 C24 C27
C20 C22 C23 C21
L/M4 PED4 PERC4 L/M5 PERC5 U/M5 PED5
IC2
U/M4
OPN
J556
C18 C17 C16 C19
C8 C10 C11 C9
PED1 PERC1 L/M3 PERC3 U/M3 PED3
GND U/M1 L/M1
J557
IC1
J558
C49
C14 C13 C12 C15
U/M7 GND L/M2 PERC2 U/M2 PED2
D3 D1 D4 D6 D2 D5
C44
J559
R29
R30
A B INH -14V GND +25V
124-000521 ISSUE C
023-000521 ISSUE C
DEMUX PWB



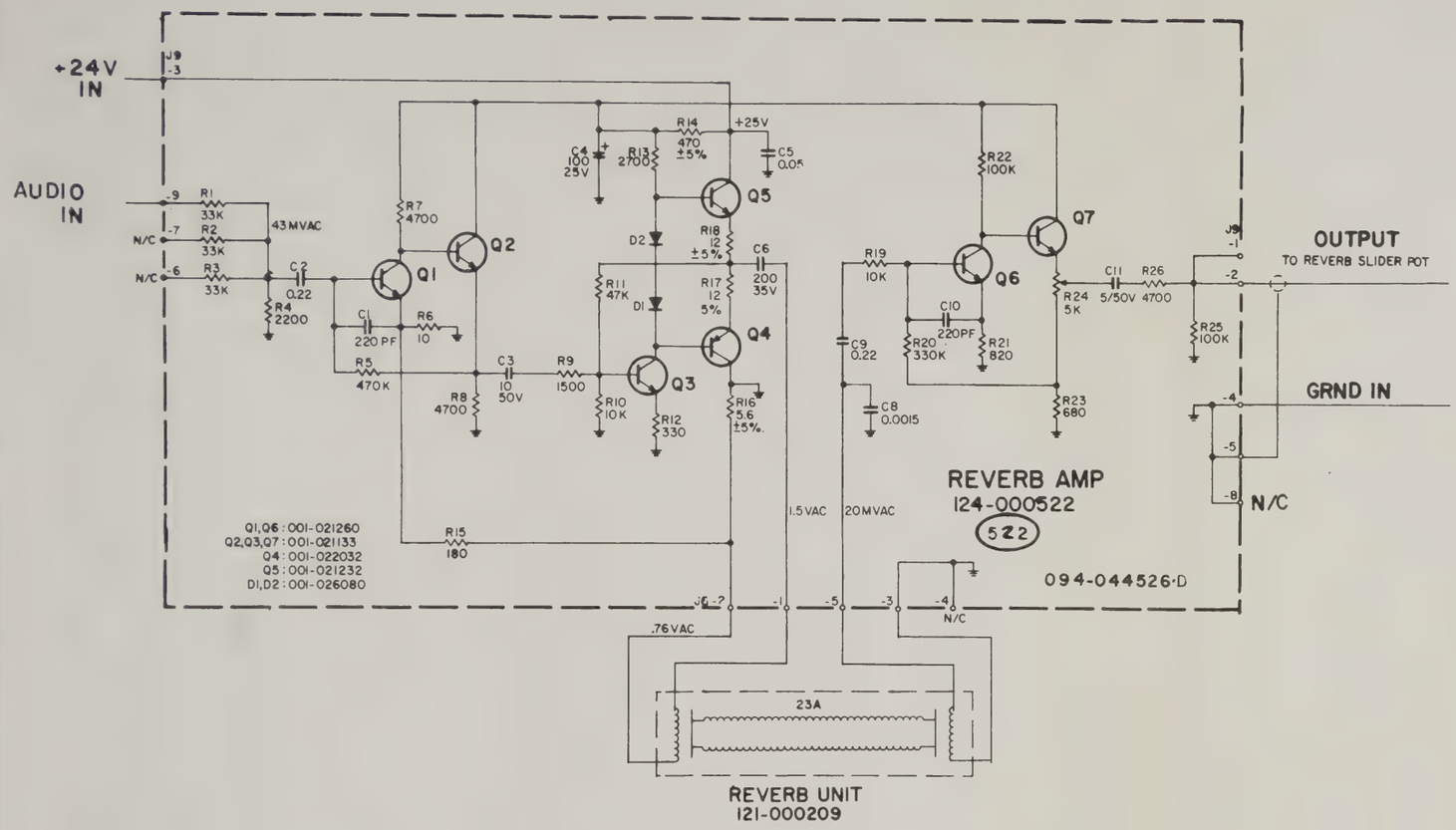


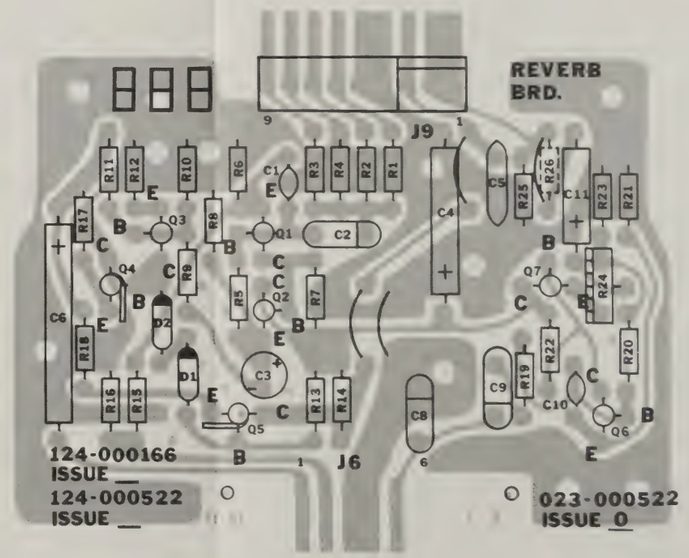
REVERB AMP
SCHEMATIC
COPPER & LEGEND
124-000522



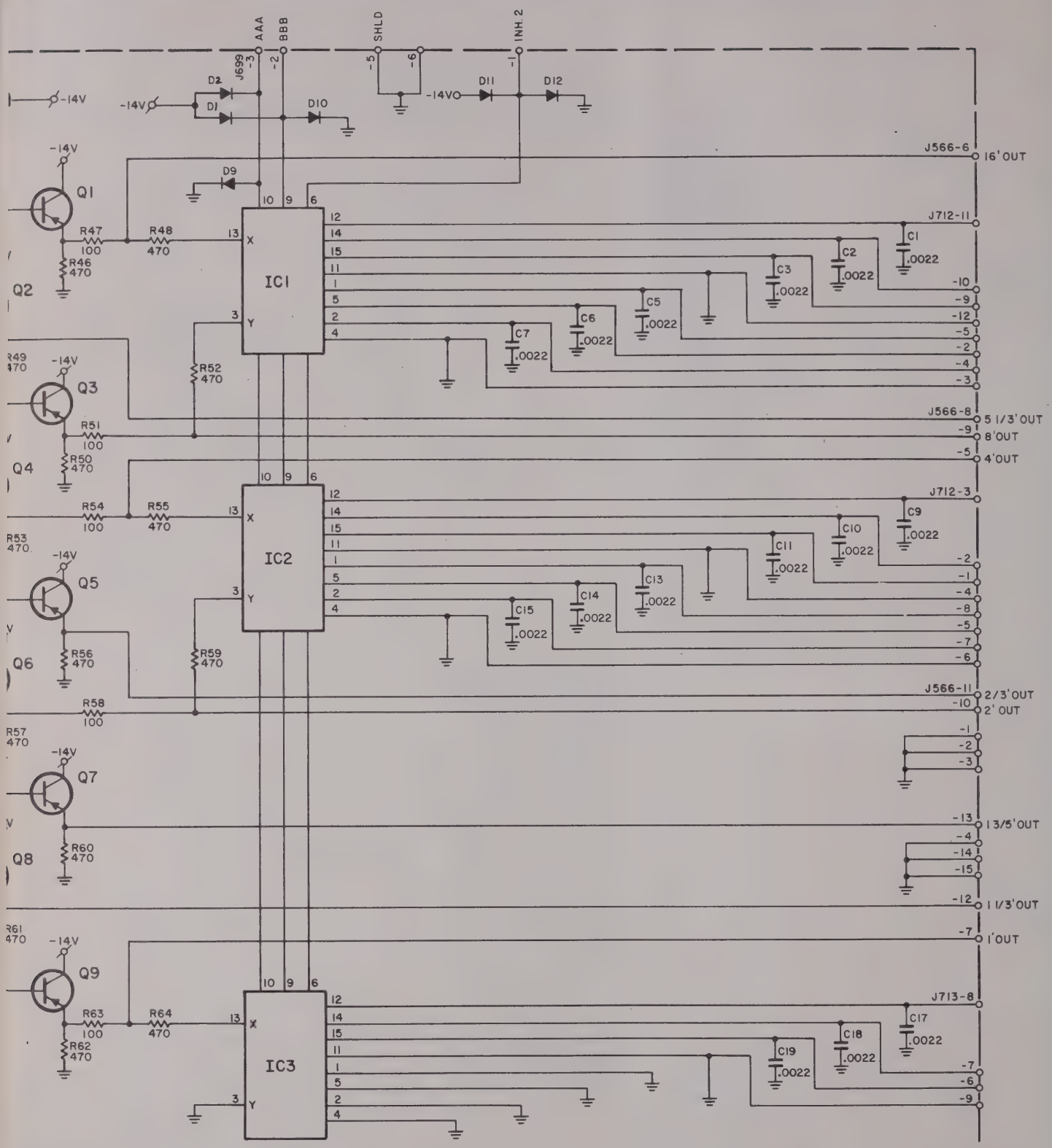


DEMULTIPLEX
SCHEMATIC
COPPER & LEGEND
124-000521





REVERB AMP
SCHEMATIC
COPPER & LEGEND
124-000522



NOTES:

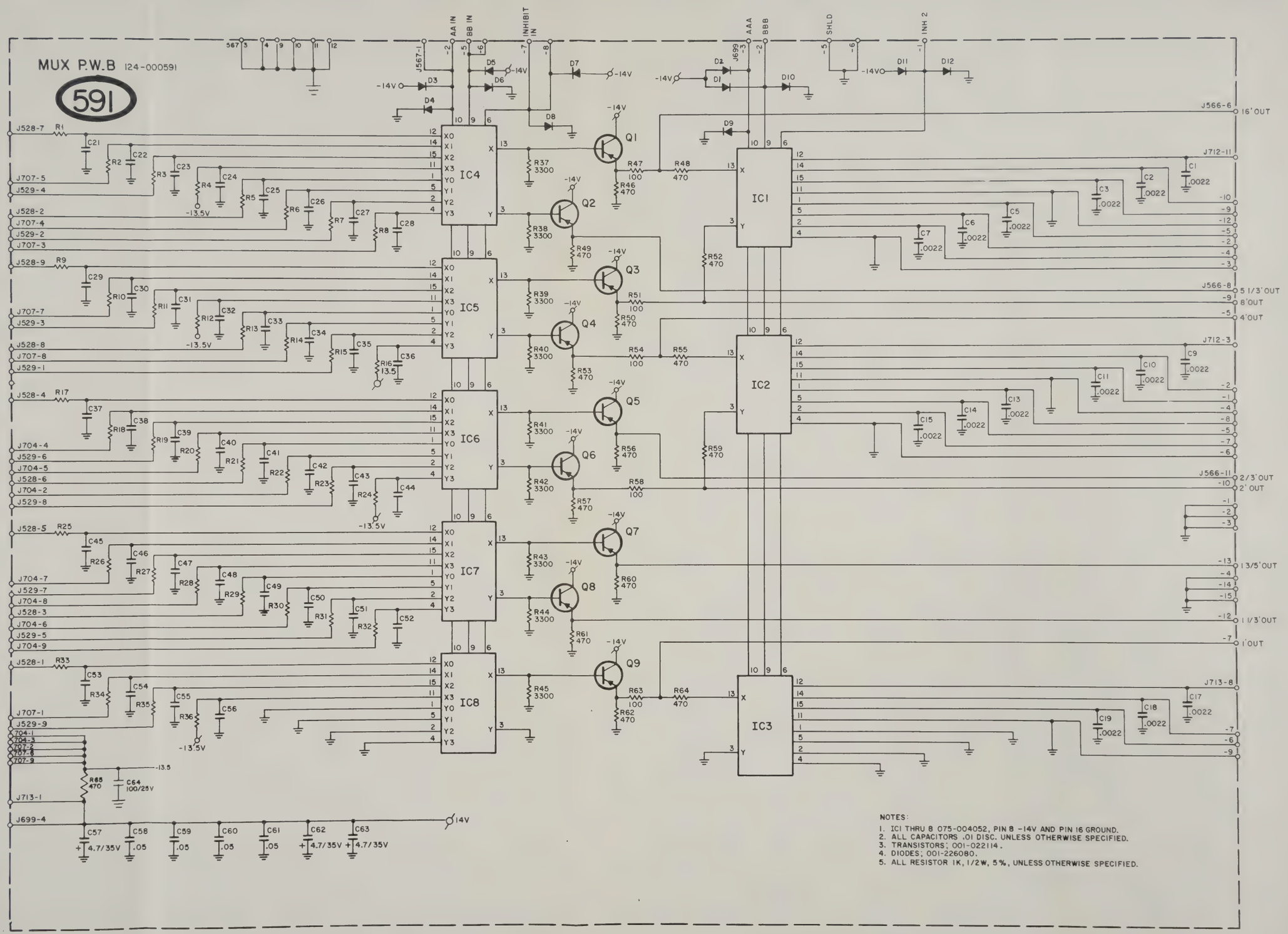
1. IC1 THRU 8 075-004052, PIN 8 -14V AND PIN 16 GROUND.
2. ALL CAPACITORS .01 DISC. UNLESS OTHERWISE SPECIFIED.
3. TRANSISTORS; 001-022114.
4. DIODES; 001-226080.
5. ALL RESISTOR 1K, 1/2W, 5%, UNLESS OTHERWISE SPECIFIED.

MULTIPLEX PWB
COPPER & LEGEND

124-000591

MUX P.W.B 124-000591

591

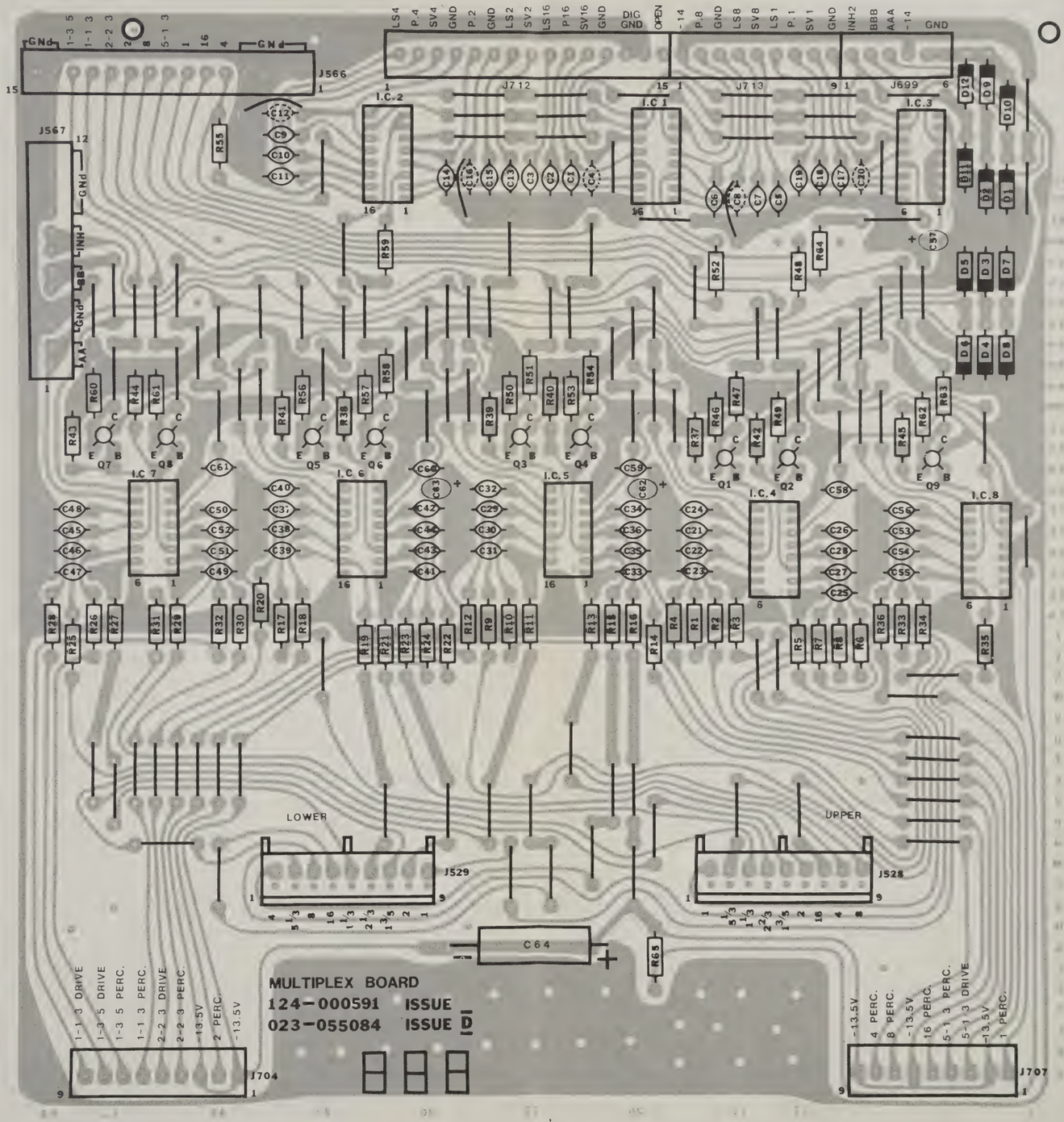


NOTES:

1. IC1 THRU 8 075-004052, PIN 8 -14V AND PIN 16 GROUND.
2. ALL CAPACITORS .01 DISC. UNLESS OTHERWISE SPECIFIED.
3. TRANSISTORS; 001-022114.
4. DIODES; 001-226080.
5. ALL RESISTOR 1K, 1/2W, 5%, UNLESS OTHERWISE SPECIFIED.

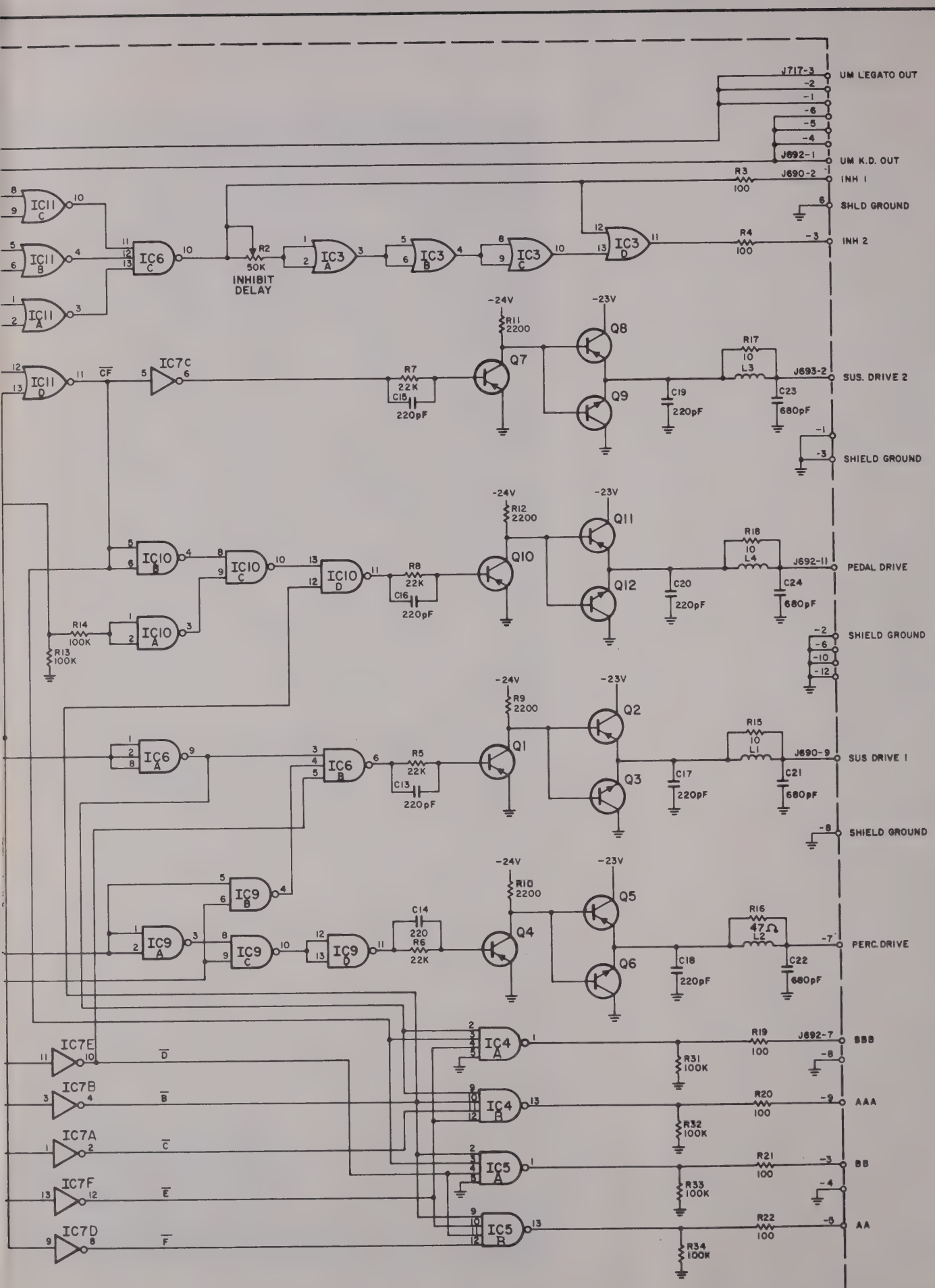
MULTIPLEX PWB
SCHEMATIC

124-000591



MULTIPLEX PWB
COPPER & LEGEND

124-000591


J717-3
-2
-1
-6
-5
-4
UM LEGATO OUT
J692-1
UM K.D. OUT
R3
100
J690-2
INH 1
SHLD GROUND
R4
100
INH 2
R2
50K
INHIBIT
DELAY
IC11 C
IC11 B
IC11 A
IC11 D
IC6 C
IC3 A
IC3 B
IC3 C
IC3 D
IC7C
-24V
-23V
R11
2200
Q7
Q8
Q9
R7
22K
C15
220pF
C19
220pF
R17
10
L3
C23
680pF
J693-2
SUS. DRIVE 2
SHIELD GROUND
R12
2200
Q10
Q11
Q12
R8
22K
C16
220pF
C20
220pF
R18
10
L4
C24
680pF
J692-11
PEDAL DRIVE
SHIELD GROUND
R14
100K
R13
100K
IC10 A
IC10 B
IC10 C
IC10 D
R9
2200
Q1
Q2
Q3
R5
22K
C13
220pF
C17
220pF
R15
10
L1
C21
680pF
J690-9
SUS DRIVE 1
SHIELD GROUND
IC6 A
IC6 B
R10
2200
Q4
Q5
Q6
C14
220
R6
22K
C18
220pF
R16
47Ω
L2
C22
680pF
PERC. DRIVE
IC9 A
IC9 B
IC9 C
IC9 D
IC7E
IC7B
IC7A
IC7F
IC7D
D
B
C
E
F
IC4 A
IC4 B
IC5 A
IC5 B
R31
100K
R32
100K
R33
100K
R34
100K
R19
100
R20
100
R21
100
R22
100
J692-7
BBB
AAA
BB
AA

LOGIC PWB
COPPER & LEGEND

124-000595

LOGIC PWB 124-000595

595

UM BUS J690-5

LOWER TO PEDAL J693-15

CLOCK IN J691-1

PH. E ON SUS (REPEATIN) -13

-24V R25 220

C9 .05 C10 .05 R24 100K Q13 C11 .15 Q14 R29 10K C12 .001 Q15 R26 47K R27 220K R28 47K R30 10K

-14V D1 D2

IC8A IC8B IC8C IC8D

-14V ÷12 PHASE BINARY COUNTER IC1

IC2 BINARY TO 1 OF 12 DECODER

J693-5 -4 -6 -24V R23* (NOTE 6) -23V C1 100/25V C2 .05

J693-9 -8 -7 -14V C3 TANT 10/25V C4 .05 C5 .05 C6 .05 C7 .05 C8 .05

R1 100K

IC11 A B C D

IC6 A B C

IC3 A B C D

R2 50K INHIBIT DELAY

R3 100 INH 1

R4 100 INH 2

IC7C IC7E IC7B IC7A IC7F IC7D

R7 22K C15 220pF Q7 Q8 Q9 R11 2200 R17 10 L3 C19 220pF C23 680pF

IC10 A B C D

R14 100K R13 100K R8 22K C16 220pF Q10 Q11 Q12 R12 2200 R18 10 L4 C20 220pF C24 680pF

IC6 A B R5 22K C13 220pF Q1 Q2 Q3 R9 2200 R15 10 L1 C17 220pF C21 680pF

IC9 A B C D C14 220 R6 22K Q4 Q5 Q6 R10 2200 R16 47Ω L2 C18 220pF C22 680pF

IC4 A B IC5 A B R31 100K R32 100K R33 100K R34 100K R19 100 R20 100 R21 100 R22 100

J717-3 -2 -1 -6 -5 -4 UM LEGATO OUT

J692-1 UM K.D. OUT

J690-2 INH 1

6 SHLD GROUND

-3 INH 2

J693-2 SUS. DRIVE 2

-1 -3 SHIELD GROUND

J692-11 PEDAL DRIVE

-2 -6 -10 -12 SHIELD GROUND

J690-9 SUS DRIVE 1

-8 SHIELD GROUND

-7 PERC. DRIVE

J692-7 -8 BBB -9 AAA -3 BB -4 -5 AA

NOTES:
1. ALL NPN TRANSISTOR 001-021314.
2. ALL PNP TRANSISTOR 001-022114.
3. ALL RESISTORS IN OHMS ±5%, 1/2W UNLESS OTHERWISE INDICATED.
4. ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE INDICATED.
5. ALL DIODES 001-226080.
6. * DENOTES FIRE RETARDANT RESISTOR SPACED 10MM FROM PWB.
7. Q13,14,15,=001-021134 094-055112

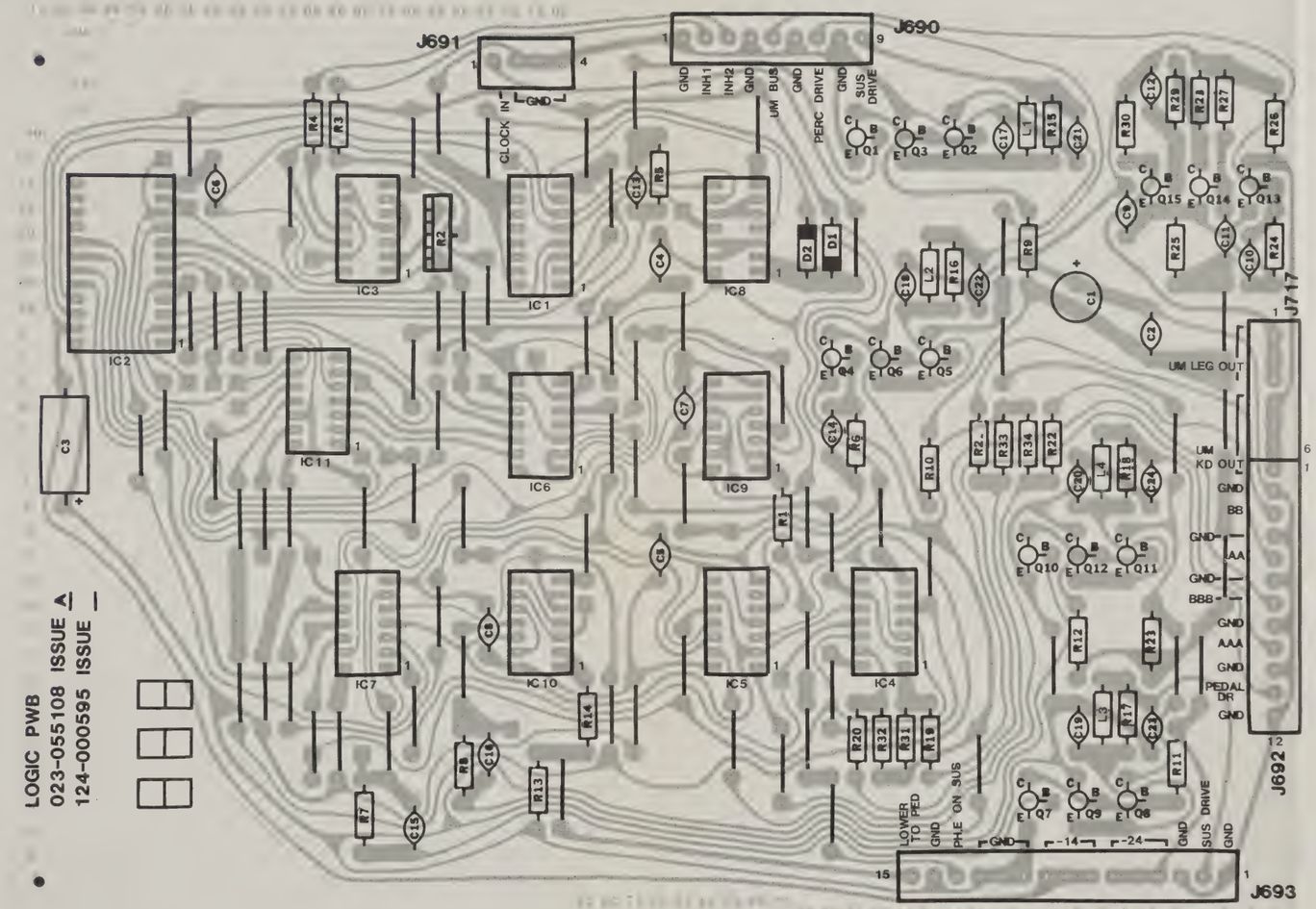
			PIN -14V	GND
IC1	075	004520	8	16
IC2	075	004514	12	24
IC3	075	004071	7	14
IC4	075	004012	7	14
IC5	075	004012	7	14
IC6	075	004023	7	14
IC7	075	004069	7	14
IC8	075	004011	7	14
IC9	075	004011	7	14
IC10	075	004011	7	14
IC11	075	004001	7	14

TIMING CHART

PHASE	BBB	AAA	BB	AA
A	1	1	0	0
B	0	1	1	1
C	1	1	1	0
D	0	0	1	1
E	1	1	0	1
F	1	0	1	1

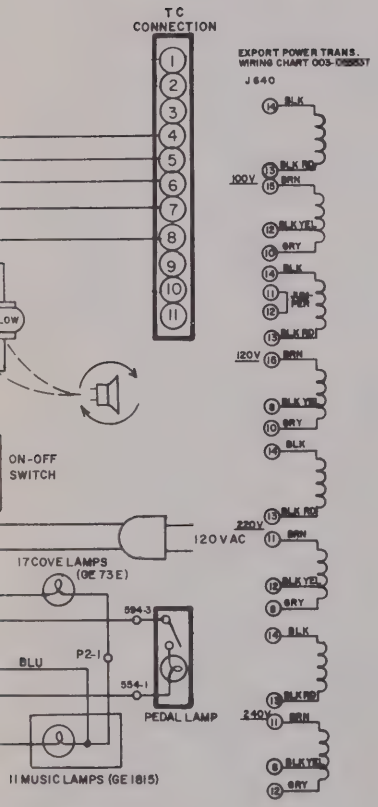
LOGIC PWB SCHEMATIC

124-000595



LOGIC PWB
COPPER & LEGEND

124-000595



ER SUPPLY

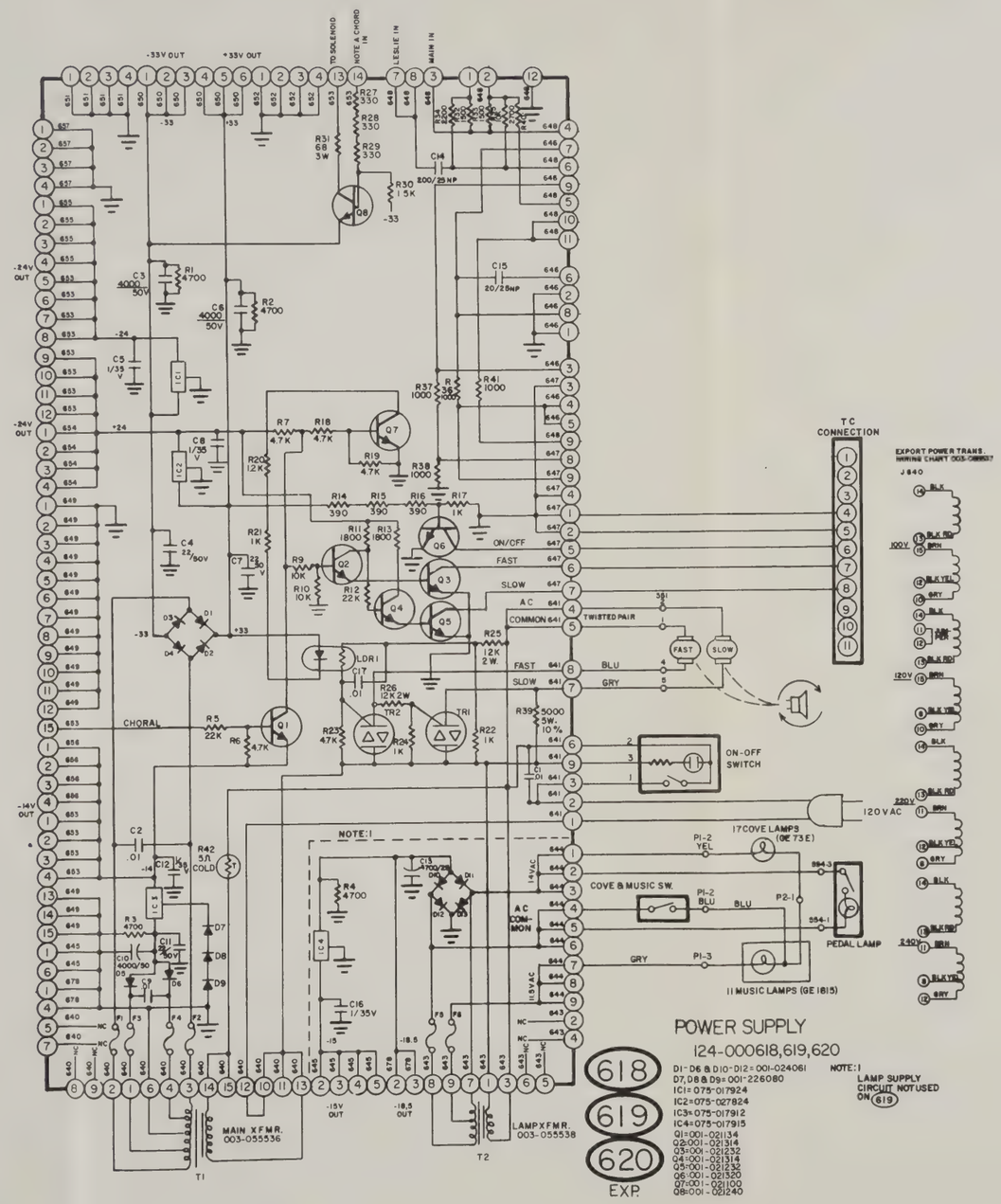
-000618,619,620

10-D12 = 001-024061
= 001-226080
17924
27824
17912
17915
1134
1314
1232
1314
1232
1320
1100
1240

NOTE: 1
LAMP SUPPLY
CIRCUIT NOT USED
ON (619)

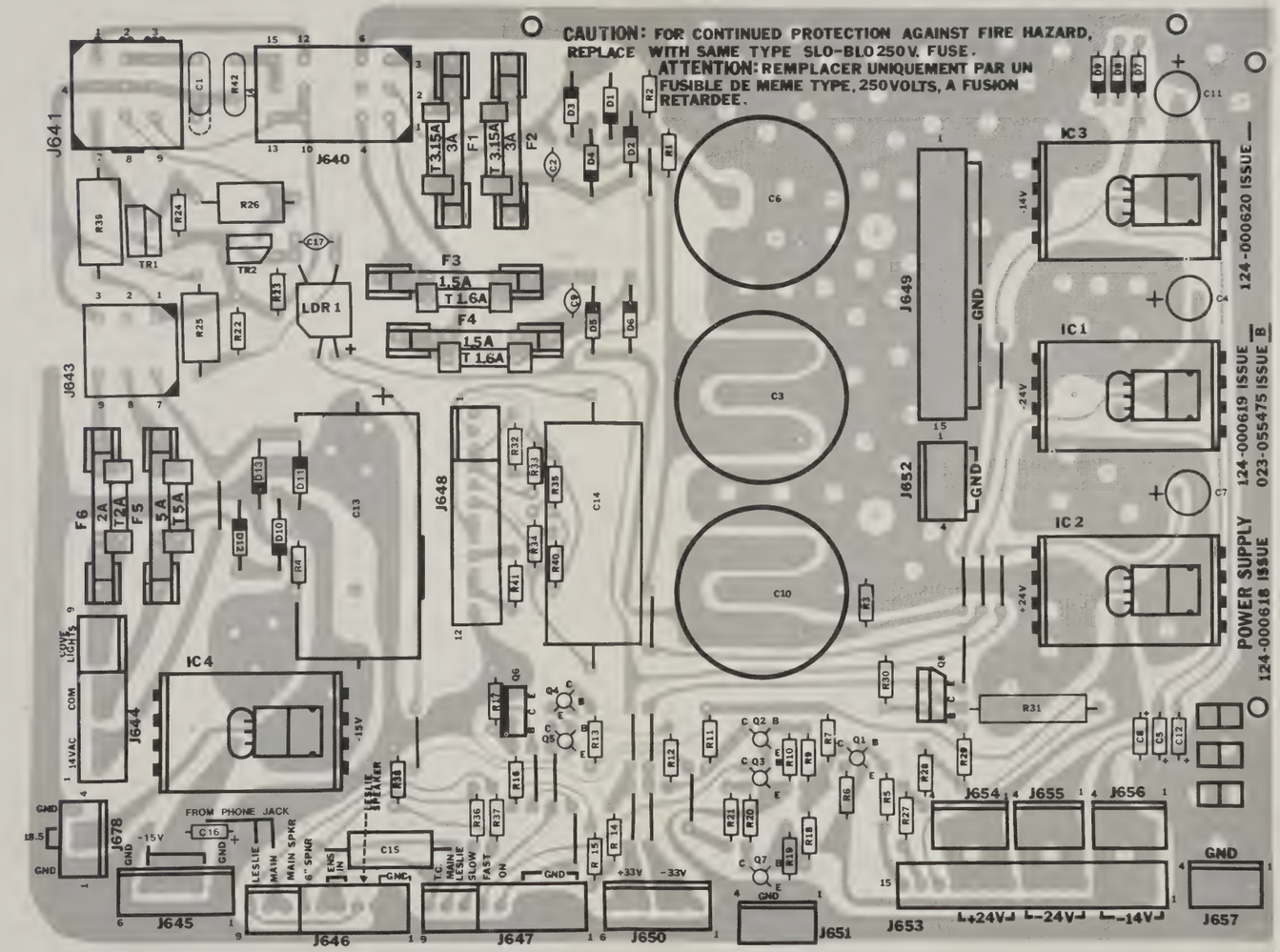
POWER SUPPLY
COPPER & LEGEND

124-000618, 620



POWER SUPPLY
SCHEMATIC

124-000618, 620



POWER SUPPLY
COPPER & LEGEND

124-000618, 620

GENERATOR PWB

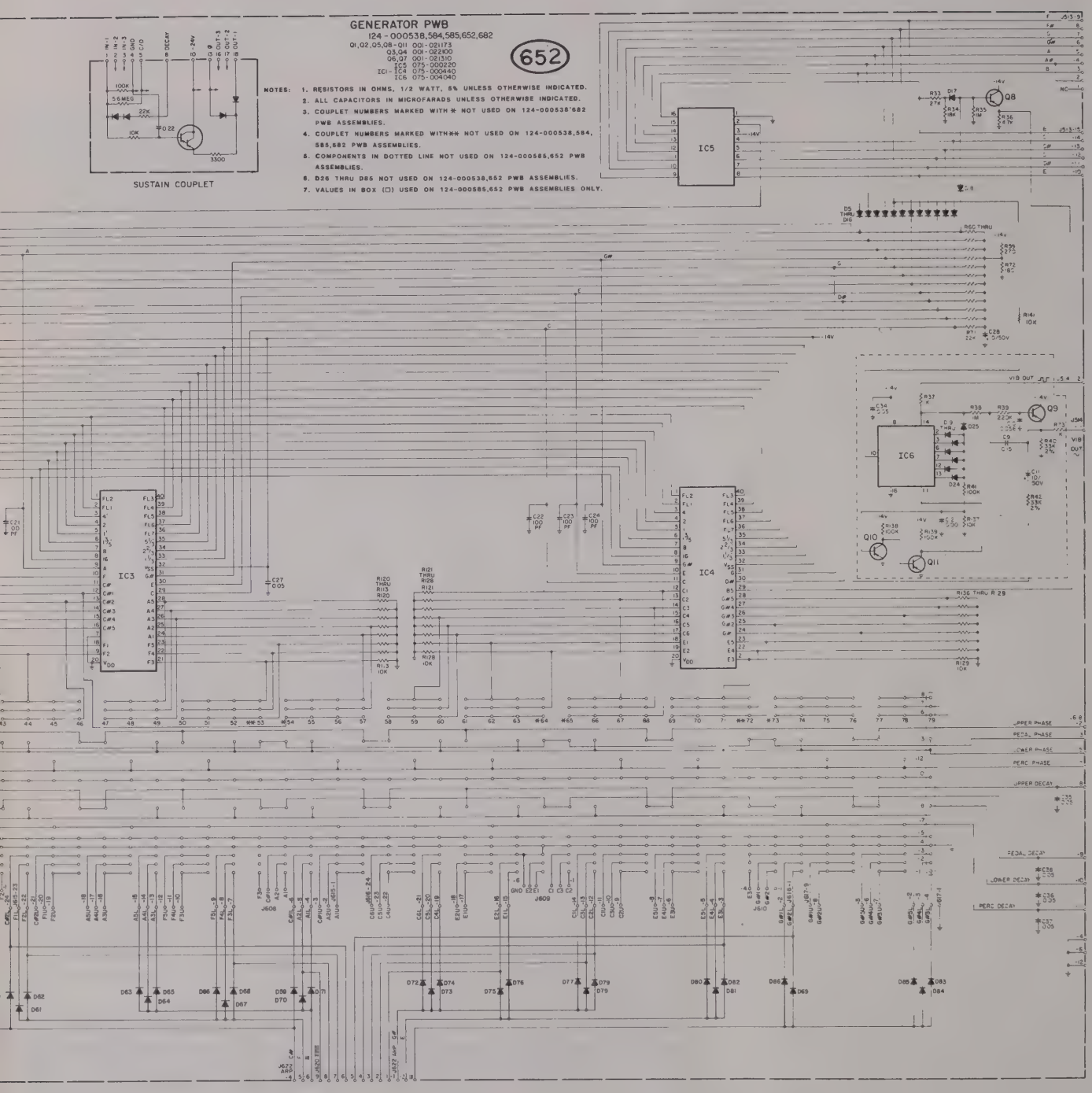
124-000538,584,585,652,682

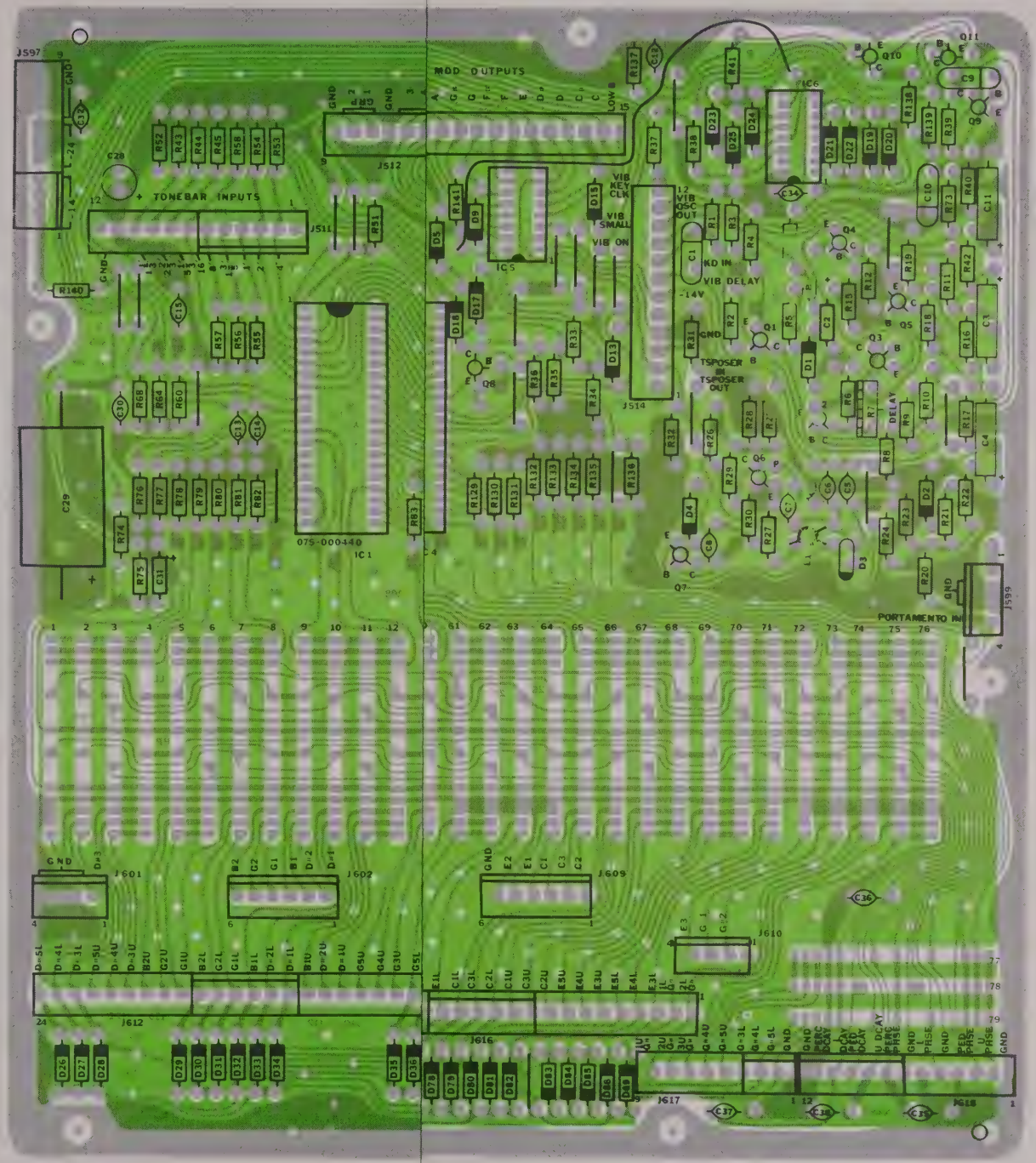
Q1,Q2,Q5,Q8-Q11 001-021173
Q3,Q4 001-022100
Q6,Q7 001-021310
IC5 075-000220
IC1-IC4 075-000440
IC6 075-004040

652

SUSTAIN COUPLET

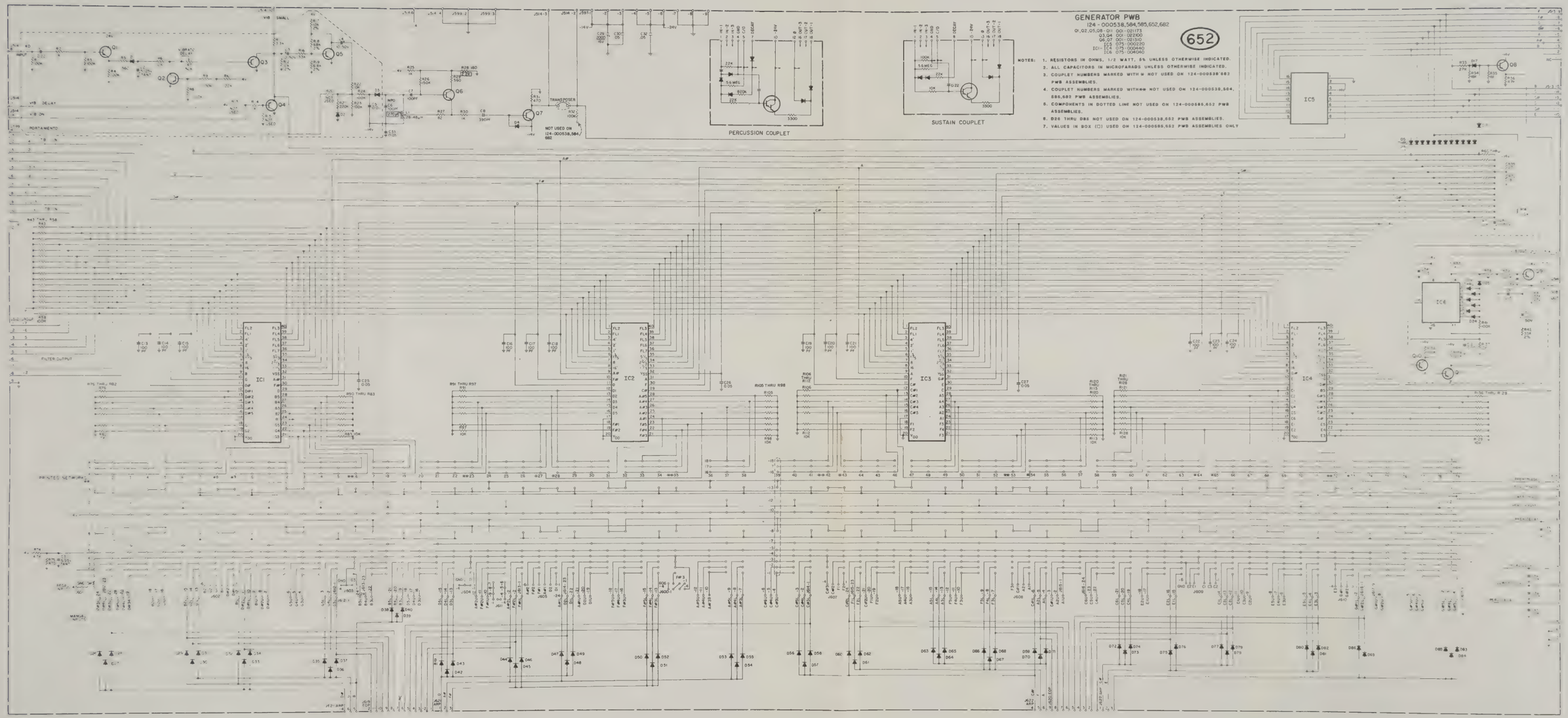
NOTES:
1. RESISTORS IN OHMS, 1/2 WATT, 5% UNLESS OTHERWISE INDICATED.
2. ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE INDICATED.
3. COUPLET NUMBERS MARKED WITH * NOT USED ON 124-000538'682 PWB ASSEMBLIES.
4. COUPLET NUMBERS MARKED WITH** NOT USED ON 124-000538,584, 585,682 PWB ASSEMBLIES.
5. COMPONENTS IN DOTTED LINE NOT USED ON 124-000585,652 PWB ASSEMBLIES.
6. D26 THRU D85 NOT USED ON 124-000538,652 PWB ASSEMBLIES.
7. VALUES IN BOX (□) USED ON 124-000585,652 PWB ASSEMBLIES ONLY.





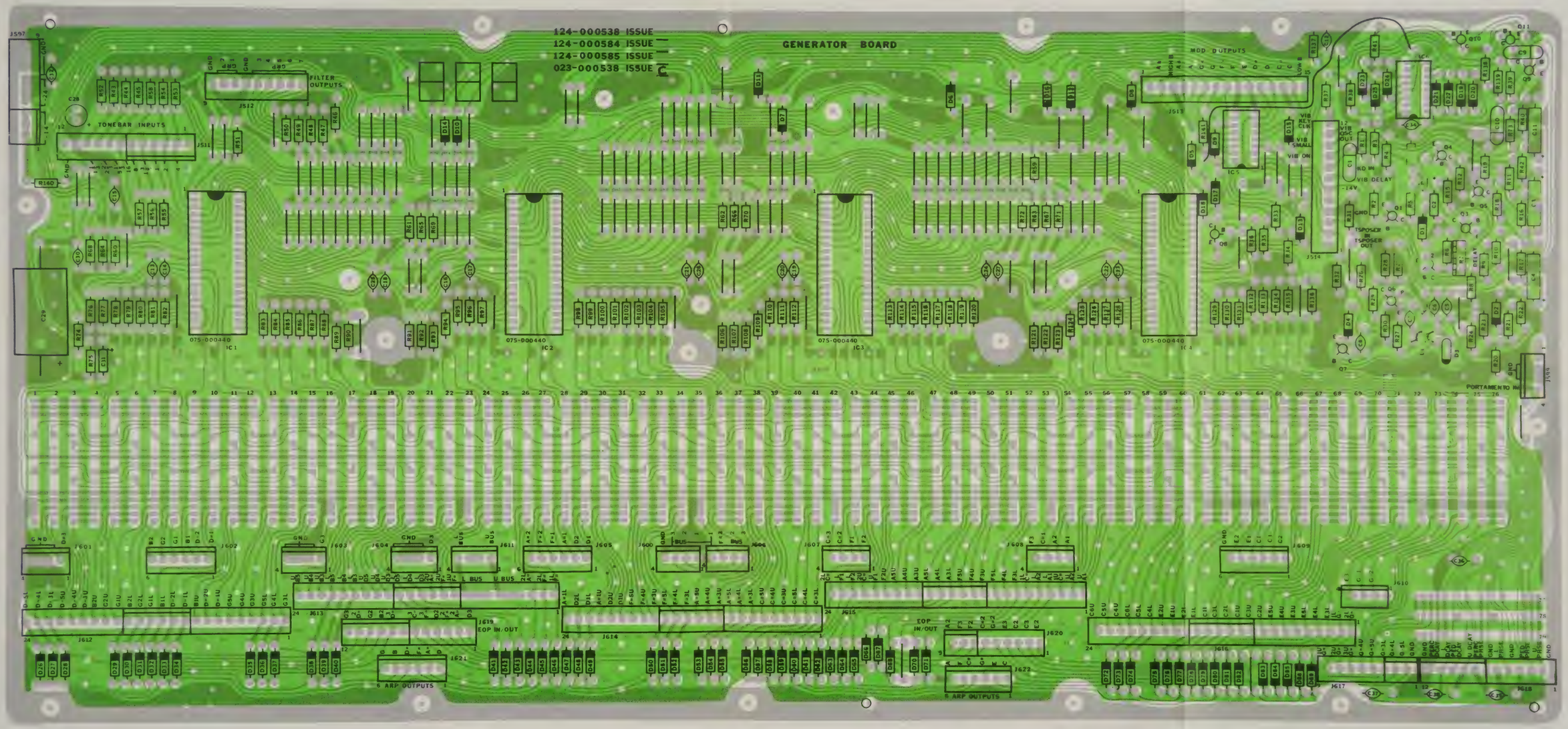
GENERATOR
COPPER & LEGEND

124-000652


GENERATOR PWB
124-000538,584,585,652,682
Q1,Q2,Q5,Q8-Q11 001-021173
Q3,Q4 001-022100
Q6,Q7 001-021310
IC1-IC3 075-000220
IC4 075-000440
IC5 075-000440
IC6 075-004040
652
NOTES:
1. RESISTORS IN OHMS, 1/2 WATT, 5% UNLESS OTHERWISE INDICATED.
2. ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE INDICATED.
3. COUPLET NUMBERS MARKED WITH # NOT USED ON 124-000538'682 PWB ASSEMBLIES.
4. COUPLET NUMBERS MARKED WITH## NOT USED ON 124-000538,584, 585,682 PWB ASSEMBLIES.
5. COMPONENTS IN DOTTED LINE NOT USED ON 124-000585,652 PWB ASSEMBLIES.
6. D26 THRU D85 NOT USED ON 124-000538,652 PWB ASSEMBLIES.
7. VALUES IN BOX (□) USED ON 124-000585,652 PWB ASSEMBLIES ONLY
PERCUSSION COUPLET
SUSTAIN COUPLET
NOT USED ON 124-000538,584, 682
VIB SWELL
VIB DELAY
VIB ON
PORTAMENTO
TRANSPOSER
FILTER OUTPUT
PRINTED NETWORK
MANUAL

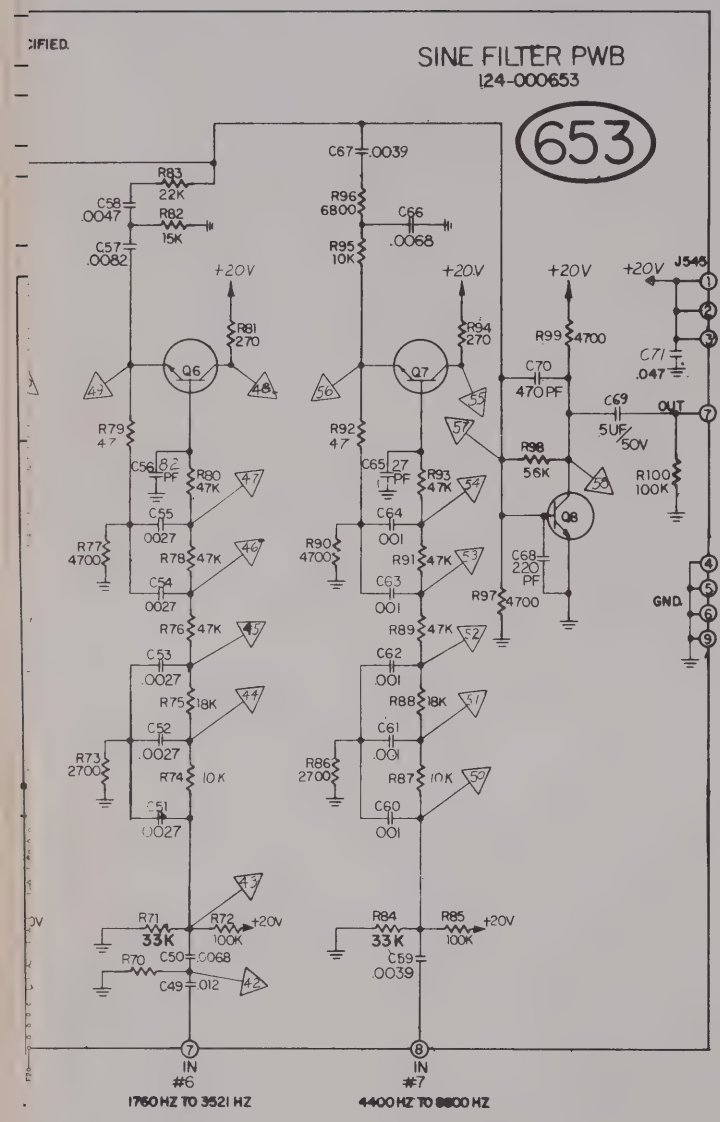
GENERATOR
SCHEMATIC

124-000652



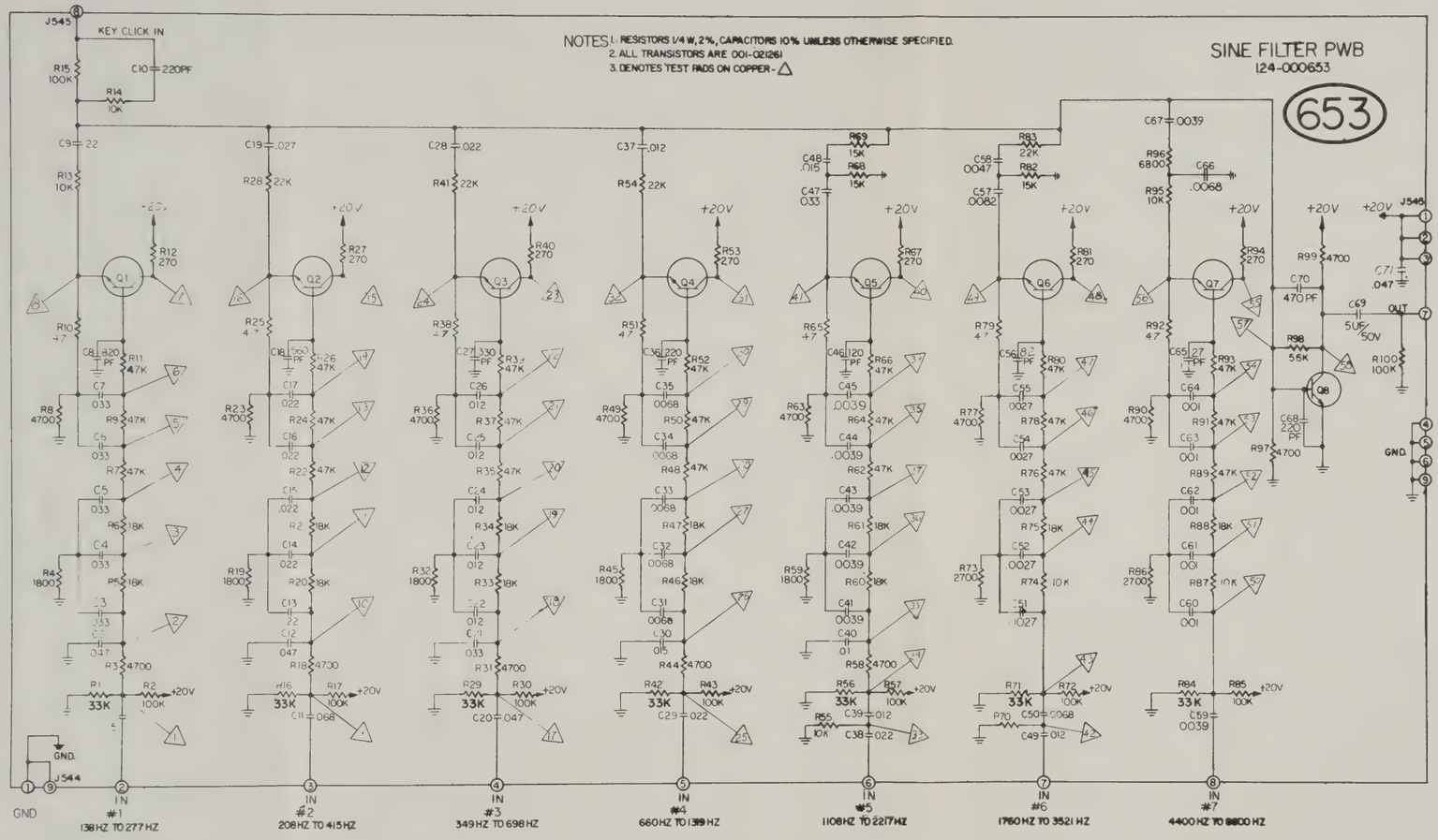
GENERATOR
COPPER & LEGEND

124-000652


SINE FILTER PWB
124-000653
653
+20V
Q6
Q7
Q8
R83 22K
R82 15K
C58 .0047
C57 .0082
R81 270
R94 270
R79 47
R92 47
C56 82 PF
C65 27 PF
R80 47K
R93 47K
C55 .0027
C64 .001
R78 47K
R91 47K
C54 .0027
C63 .001
R76 47K
R89 47K
C53 .0027
C62 .001
R75 18K
R88 18K
C52 .0027
C61 .001
R74 10K
R87 10K
C51 .0027
C60 .001
R77 4700
R90 4700
R73 2700
R86 2700
C67 .0039
R96 6800
C66 .0068
R95 10K
R99 4700
C70 470 PF
C69 5UF 50V
R98 56K
R97 4700
C68 220 PF
R100 100K
J545
C71 .047
OUT
GND
R71 33K
R72 100K
R70
C50 .0068
C49 .012
R84 33K
R85 100K
C59 .0039
IN #6
1760 HZ TO 3521 HZ
IN #7
4400 HZ TO 8800 HZ

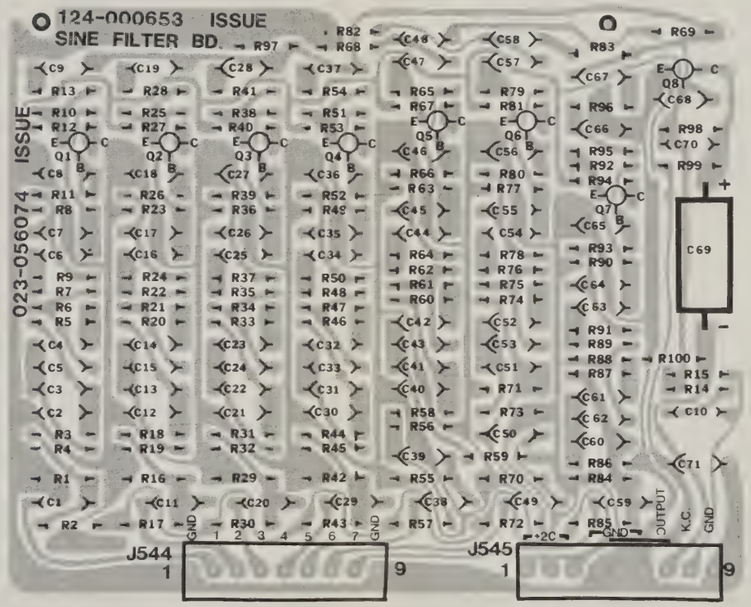
SINE FILTER
COPPER & LEGEND

124-000653



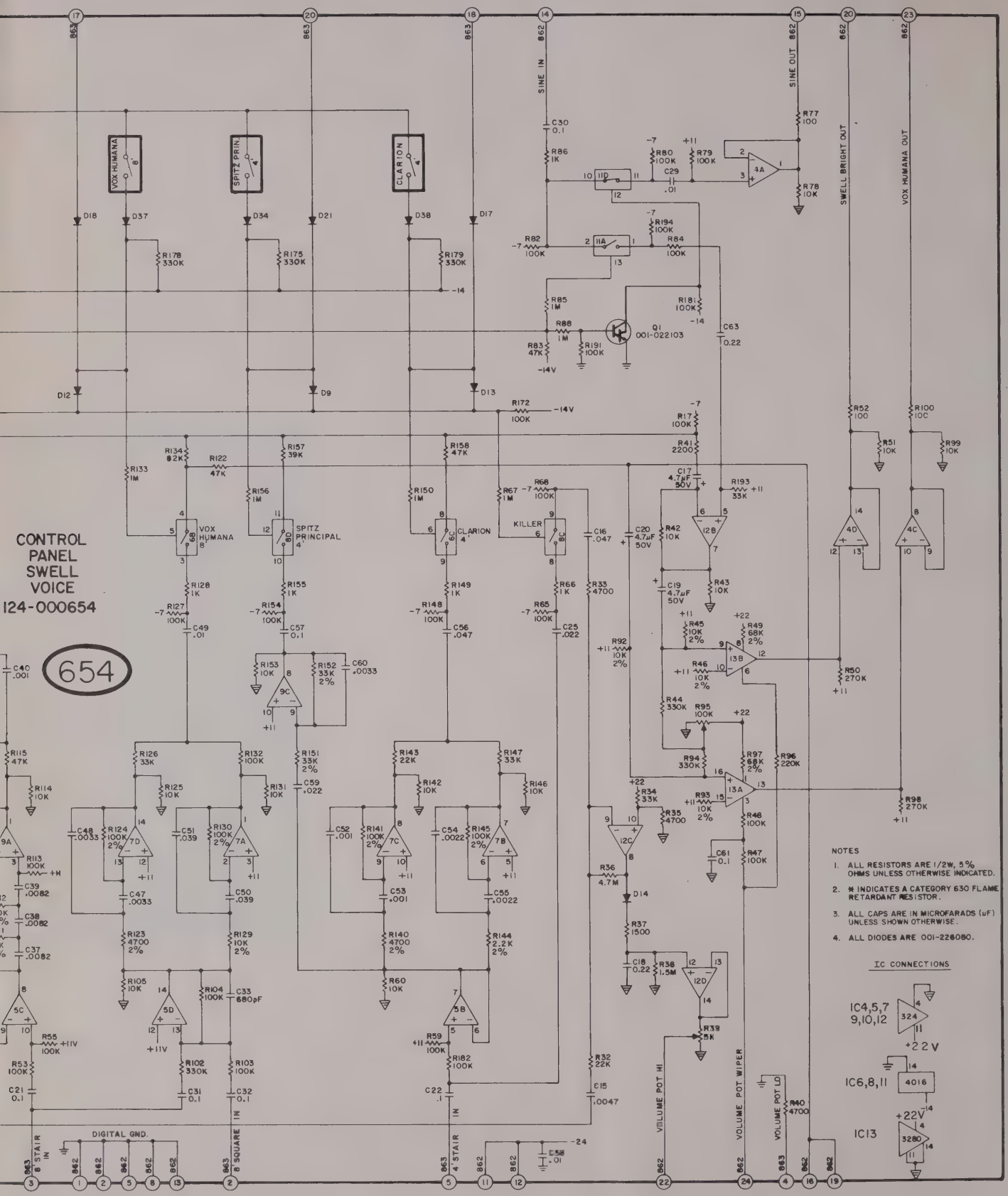
SINE FILTER
SCHEMATIC

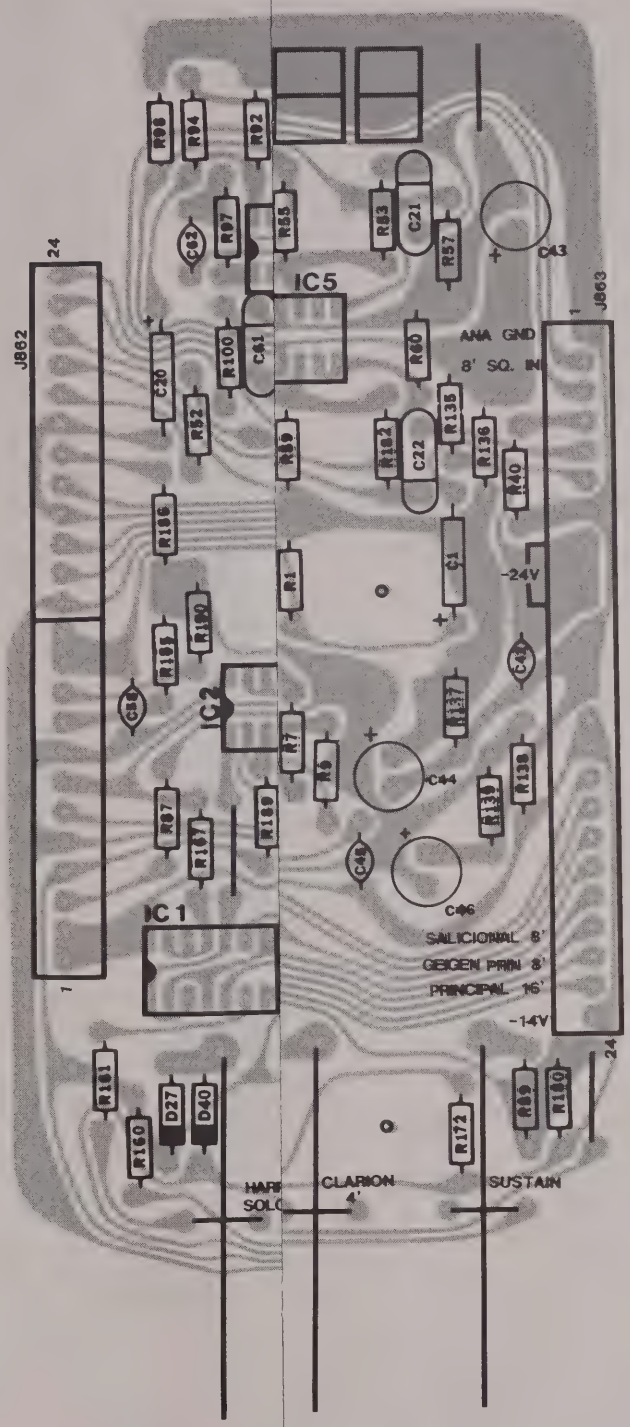
124-000653



SINE FILTER
COPPER & LEGEND

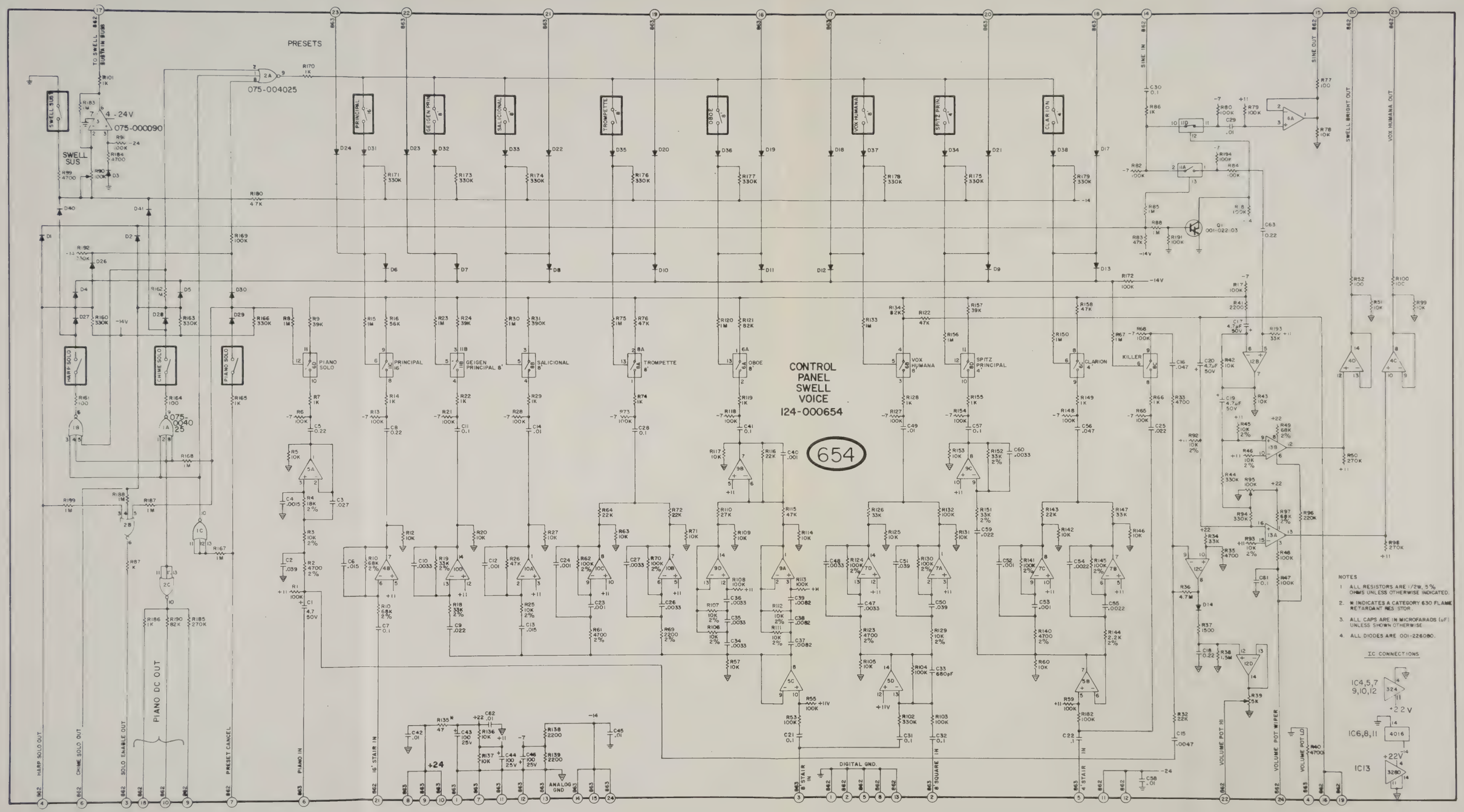
124-000653


CONTROL PANEL SWELL VOICE 124-000654
654
VOX HUMANA 8'
SPITZ PRINCIPAL 4'
CLARION 4'
KILLER
SINE IN
SINE OUT
SWELL BRIGHT OUT
VOX HUMANA OUT
VOLUME POT HI
VOLUME POT WIPER
VOLUME POT LO
DIGITAL GND.
8' STAIR IN
8' SQUARE IN
4' STAIR IN
Q1 001-022103
NOTES
1. ALL RESISTORS ARE 1/2W, 5% OHMS UNLESS OTHERWISE INDICATED.
2. M INDICATES A CATEGORY 630 FLAME RETARDANT RESISTOR.
3. ALL CAPS ARE IN MICROFARADS (uF) UNLESS SHOWN OTHERWISE.
4. ALL DIODES ARE 001-226080.
IC CONNECTIONS
IC4,5,7 9,10,12
324
+22 V
IC6,8,11
4016
IC13
3280



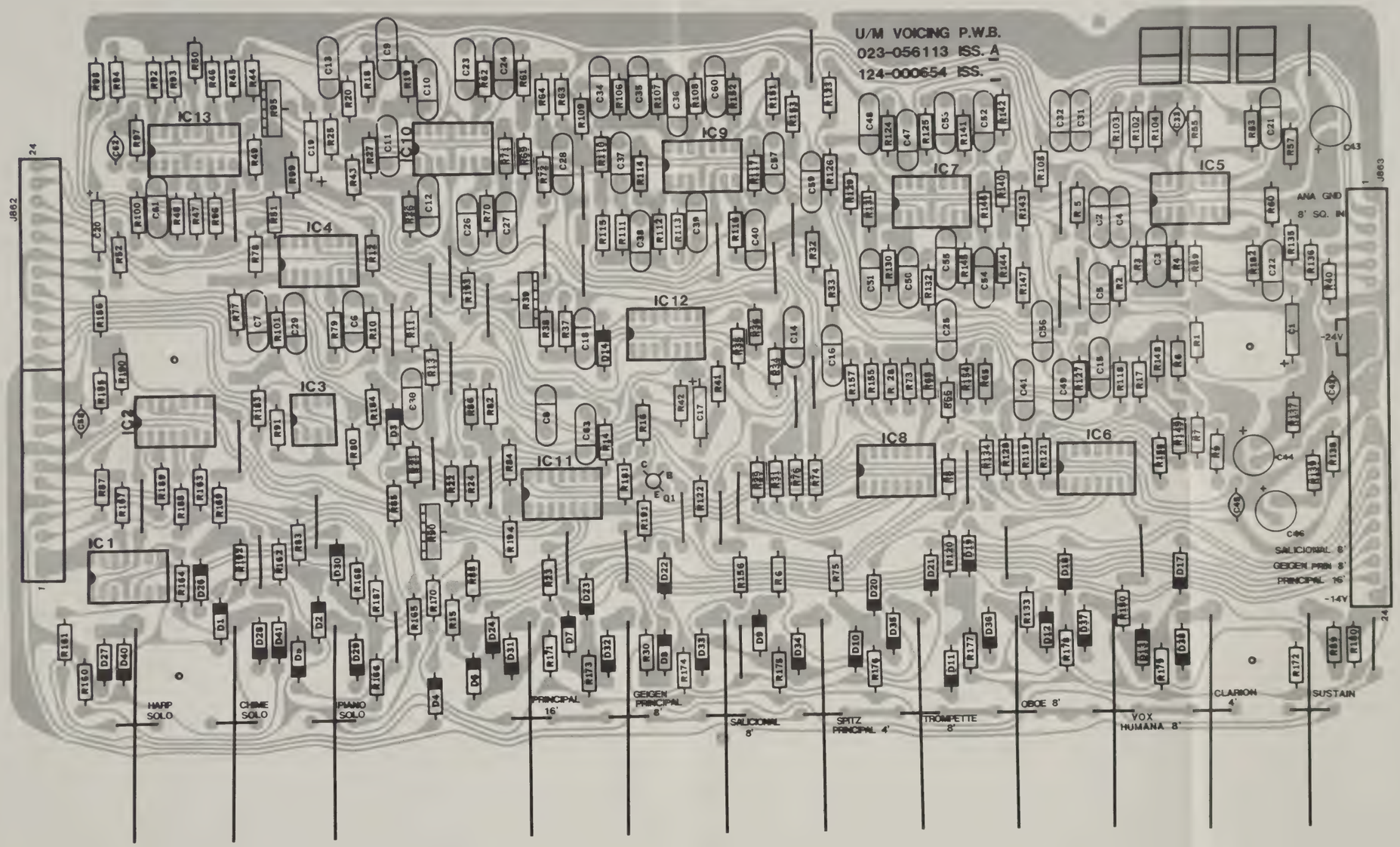
CONTROL PANEL SWELL VOICE PWB
COPPER & LEGEND

124-000654



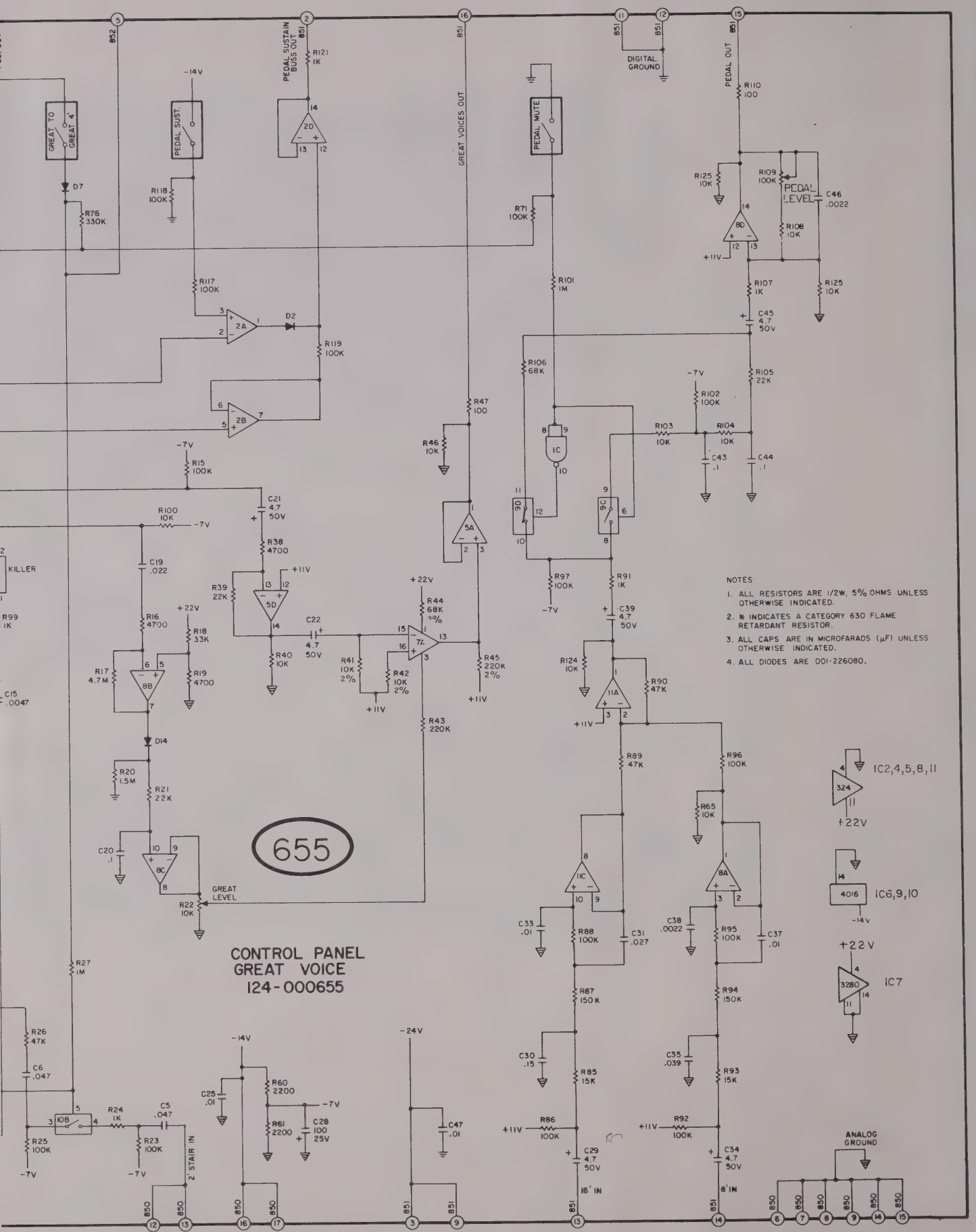
CONTROL PANEL SWELL VOICE PWB SCHEMATIC

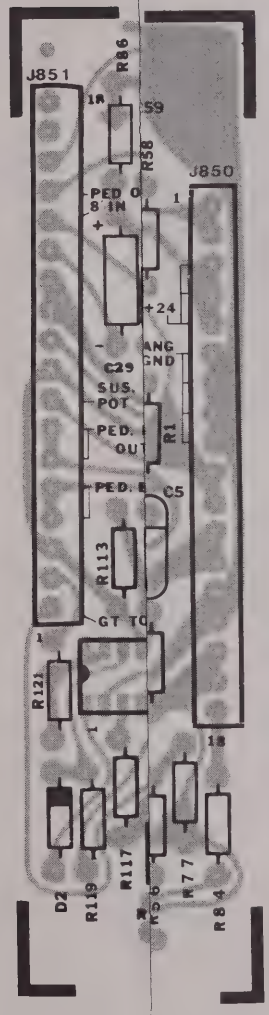
124-000654



CONTROL PANEL SWELL VOICE PWB
COPPER & LEGEND

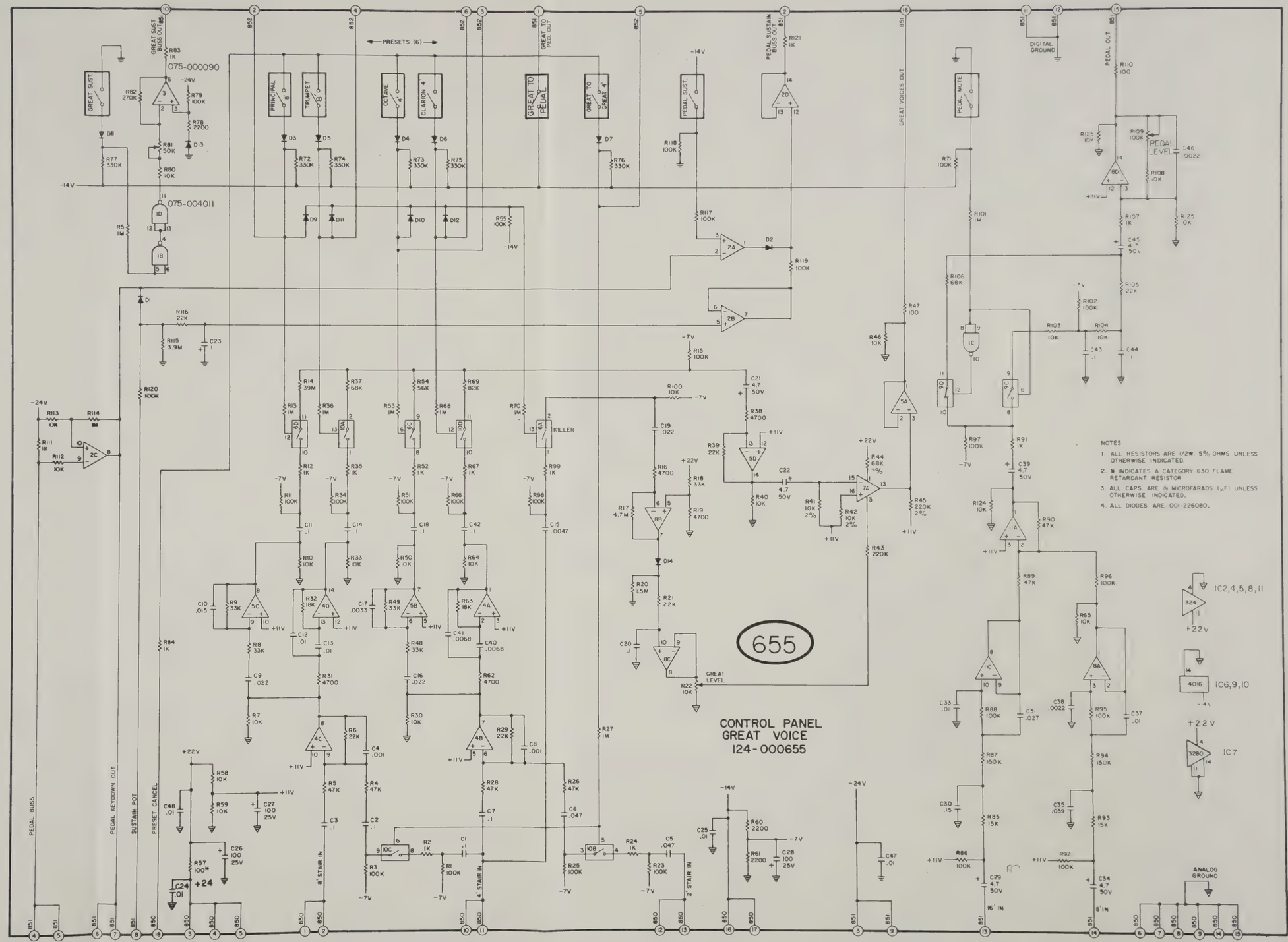
124-000654


GREAT TO GREAT 4'
PEDAL SUST.
PEDAL SUSTAIN BUSS OUT
GREAT VOICES OUT
PEDAL MUTE
DIGITAL GROUND
PEDAL OUT
PEDAL LEVEL
KILLER
GREAT LEVEL
655
CONTROL PANEL
GREAT VOICE
124-000655
2' STAIR IN
16' IN
8' IN
ANALOG GROUND
IC2,4,5,8,11
IC6,9,10
IC7
NOTES:
1. ALL RESISTORS ARE 1/2W, 5% OHMS UNLESS OTHERWISE INDICATED.
2. * INDICATES A CATEGORY 630 FLAME RETARDANT RESISTOR.
3. ALL CAPS ARE IN MICROFARADS (μF) UNLESS OTHERWISE INDICATED.
4. ALL DIODES ARE 001-226080.



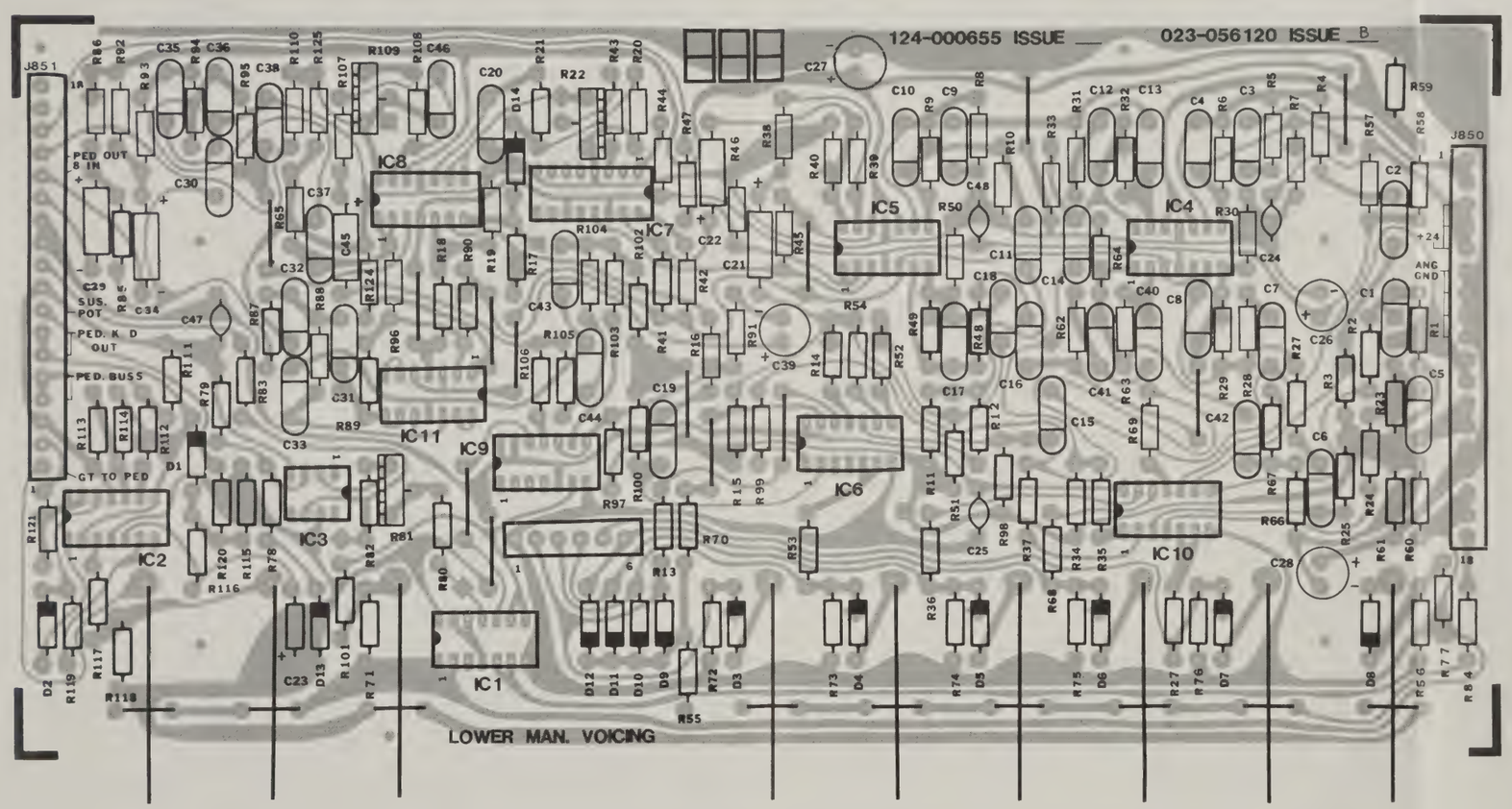
CONTROL PANEL GREAT VOICE PWB
COPPER & LEGEND

124-000655



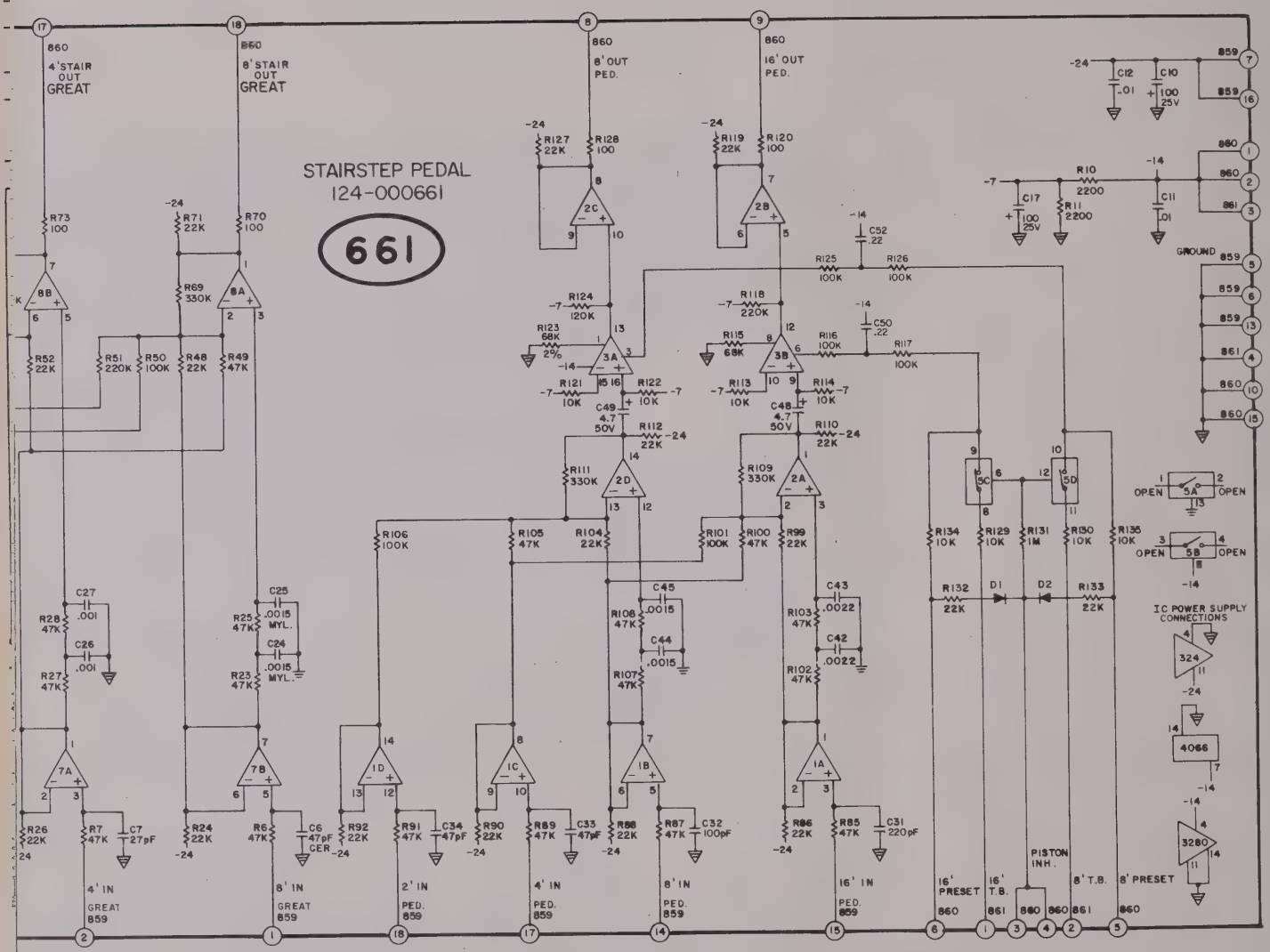
CONTROL PANEL GREAT VOICE PWB SCHEMATIC

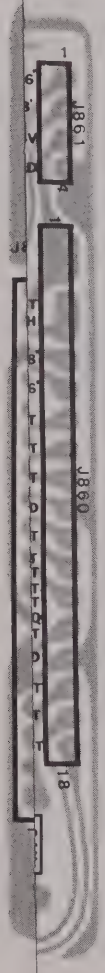
124-000655



CONTROL PANEL GREAT VOICE PWB
COPPER & LEGEND

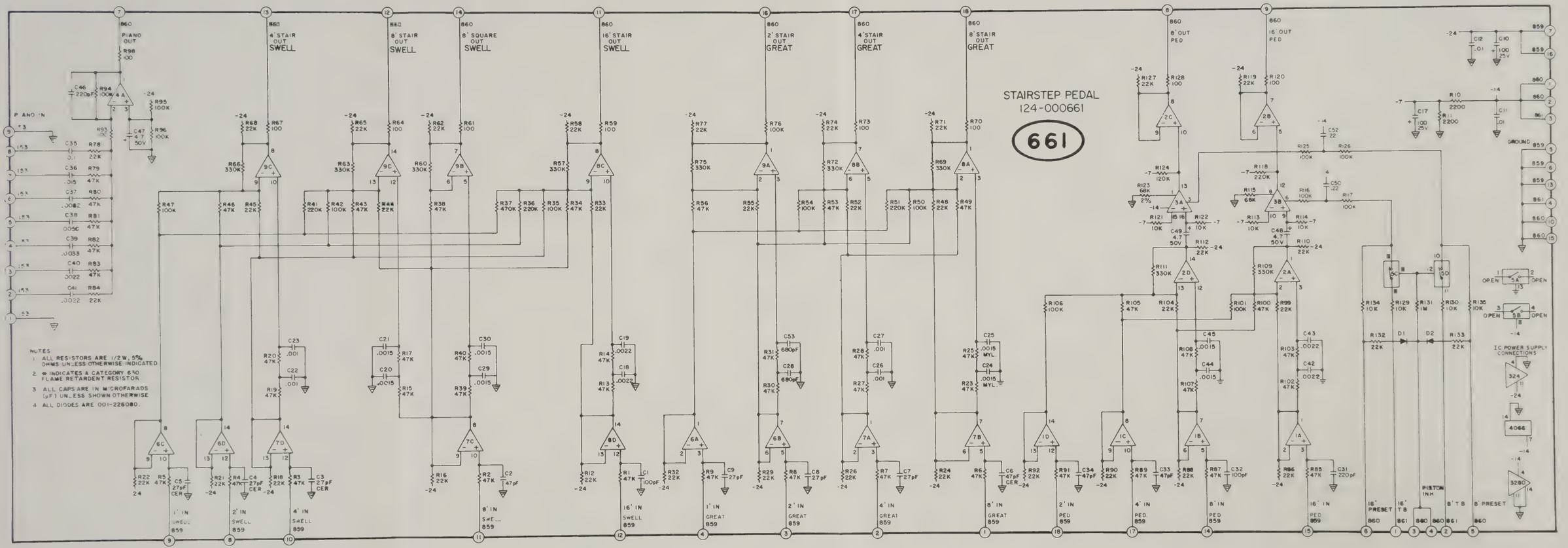
124-000655


STAIRSTEP PEDAL
124-000661
661
4' STAIR OUT GREAT
8' STAIR OUT GREAT
8' OUT PED.
16' OUT PED.
GROUND
IC POWER SUPPLY CONNECTIONS
PISTON INH.
16' PRESET
16' T.B.
8' T.B.
8' PRESET
4' IN GREAT
8' IN GREAT
2' IN PED.
4' IN PED.
8' IN PED.
16' IN PED.
OPEN



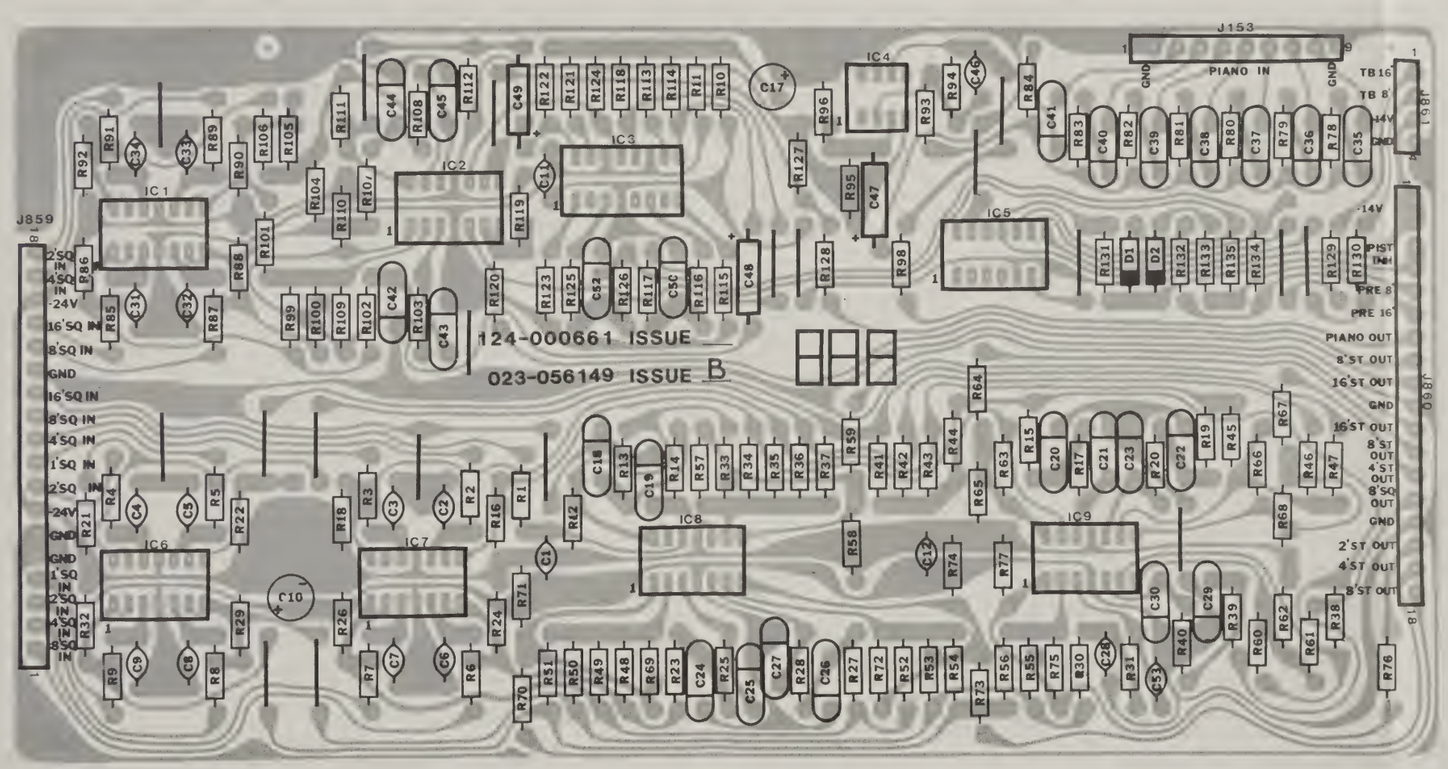
STAIRSTEP PEDAL
COPPER & LEGEND

124-000661



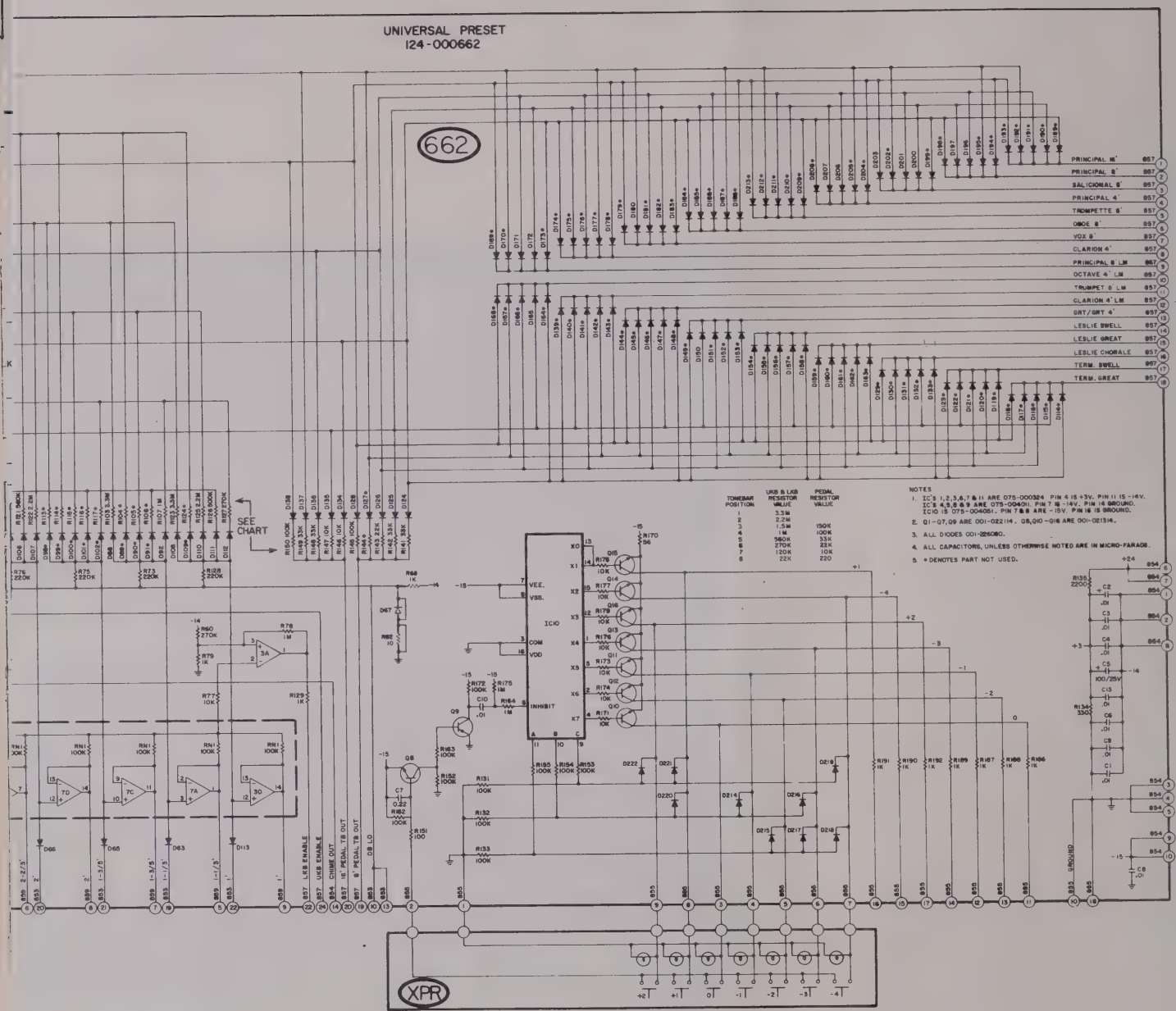
STAIRSTEP PEDAL
SCHEMATIC

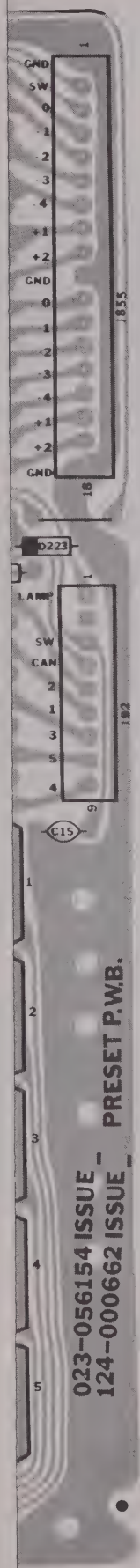
124-000661



STAIRSTEP PEDAL
COPPER & LEGEND

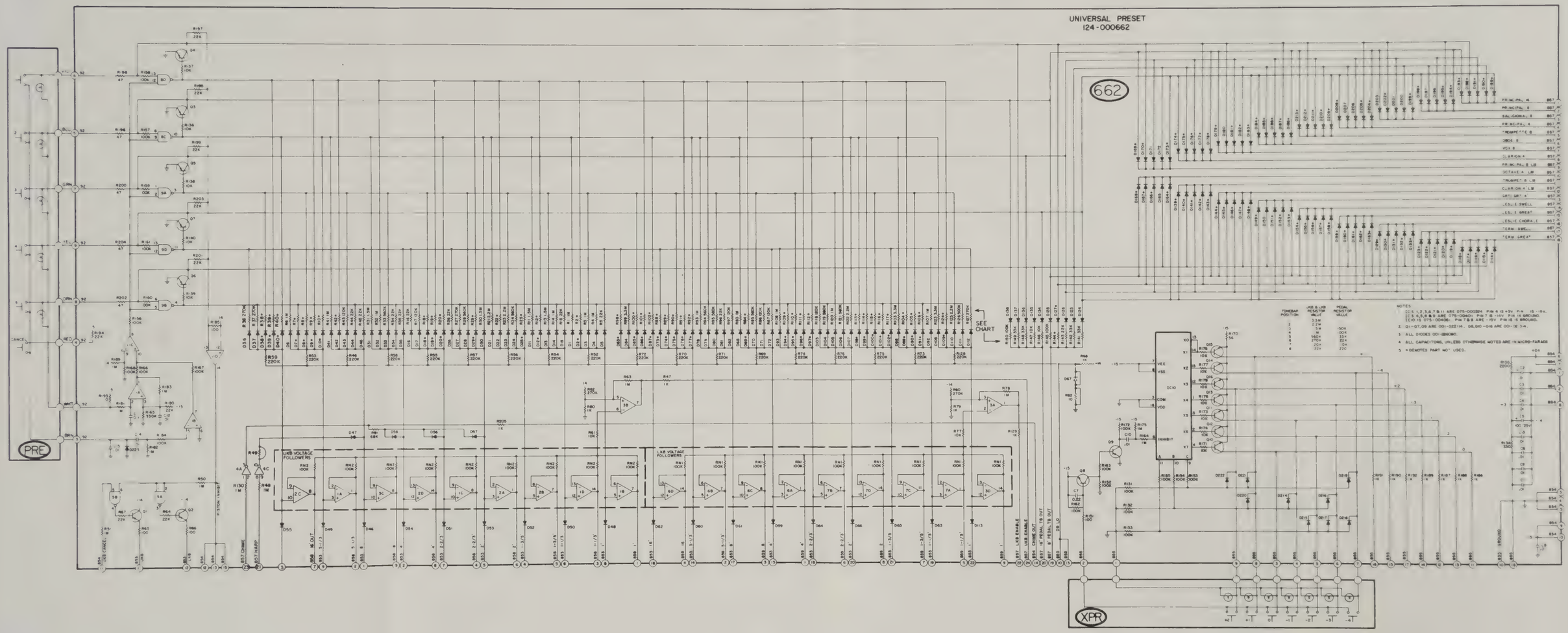
124-000661


UNIVERSAL PRESET
124-000662
662
PRINCIPAL 16'
PRINCIPAL 8'
SALICIONAL 8'
PRINCIPAL 4'
TRUMPETTE 8'
OBOE 8'
VOX 8'
CLARION 4'
PRINCIPAL 8' LM
OCTAVE 4' LM
TRUMPET 8' LM
CLARION 4' LM
GRT/GRT 4'
LESLIE SWELL
LESLIE GREAT
LESLIE CHORALE
TERM. SWELL
TERM. GREAT
SEE CHART
IC10
VEE.
VSS.
COM
VDD
INHIBIT
LKB ENABLE
UKB ENABLE
CHIME OUT
16' PEDAL TB OUT
8' PEDAL TB OUT
GROUND
XPR
TONEBAR POSITION
UKB & LKB RESISTOR VALUE
PEDAL RESISTOR VALUE
NOTES
1. IC's 1,2,3,6,7 & 11 ARE 075-000324. PIN 4 IS +5V. PIN 11 IS -14V. IC's 4,5,8 & 9 ARE 075-004091. PIN 7 IS -14V. PIN 14 GROUND. IC10 IS 075-004081. PIN 7 & 8 ARE -15V. PIN 16 IS GROUND.
2. Q1-Q7,Q9 ARE 001-022114. Q8,Q10-Q16 ARE 001-021314.
3. ALL DIODES 001-226080.
4. ALL CAPACITORS, UNLESS OTHERWISE NOTED ARE IN MICRO-FARADS.
5. * DENOTES PART NOT USED.



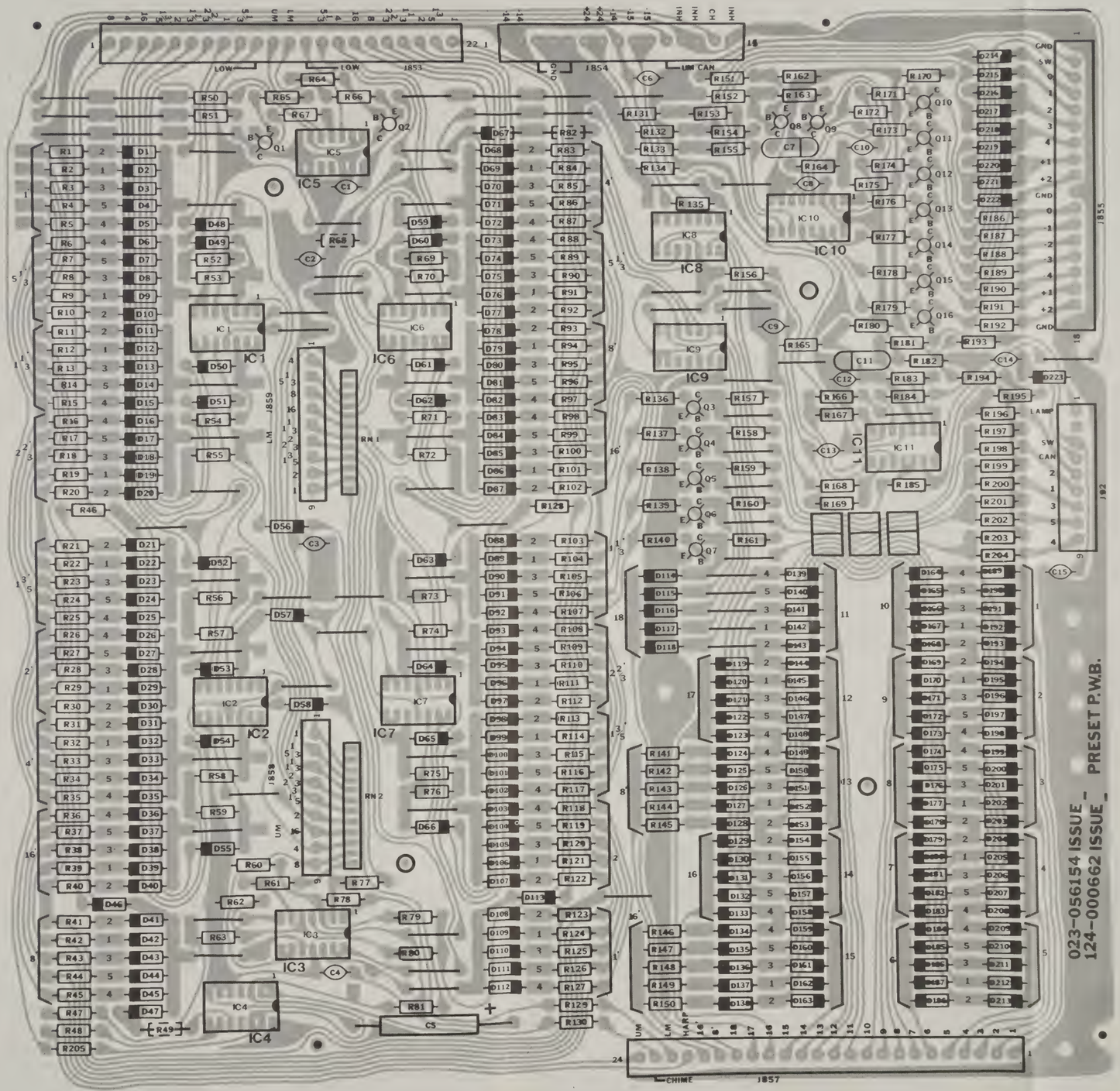
UNIVERSAL PRESET
COPPER & LEGEND

124-000662



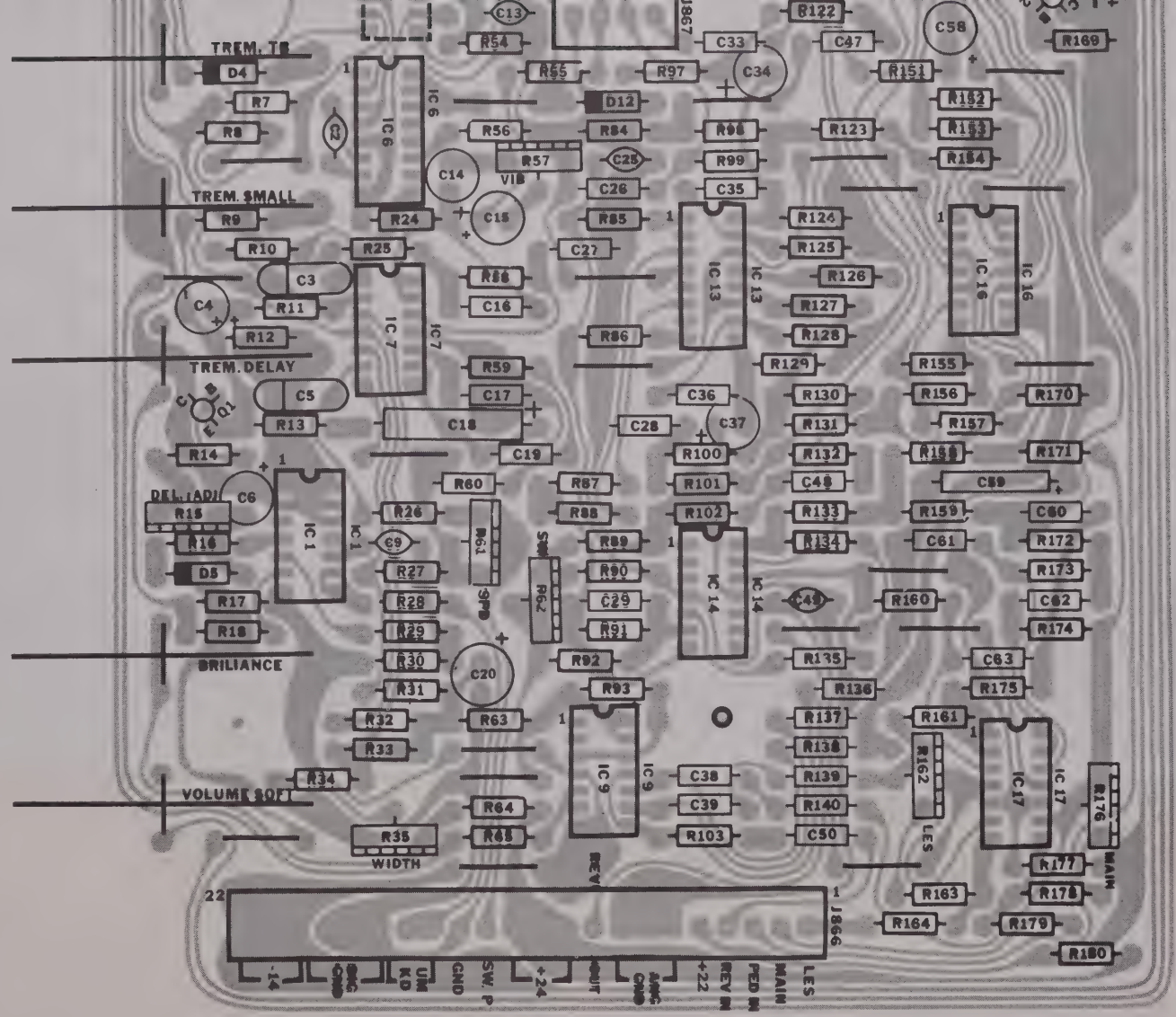
UNIVERSAL PRESET
SCHEMATIC

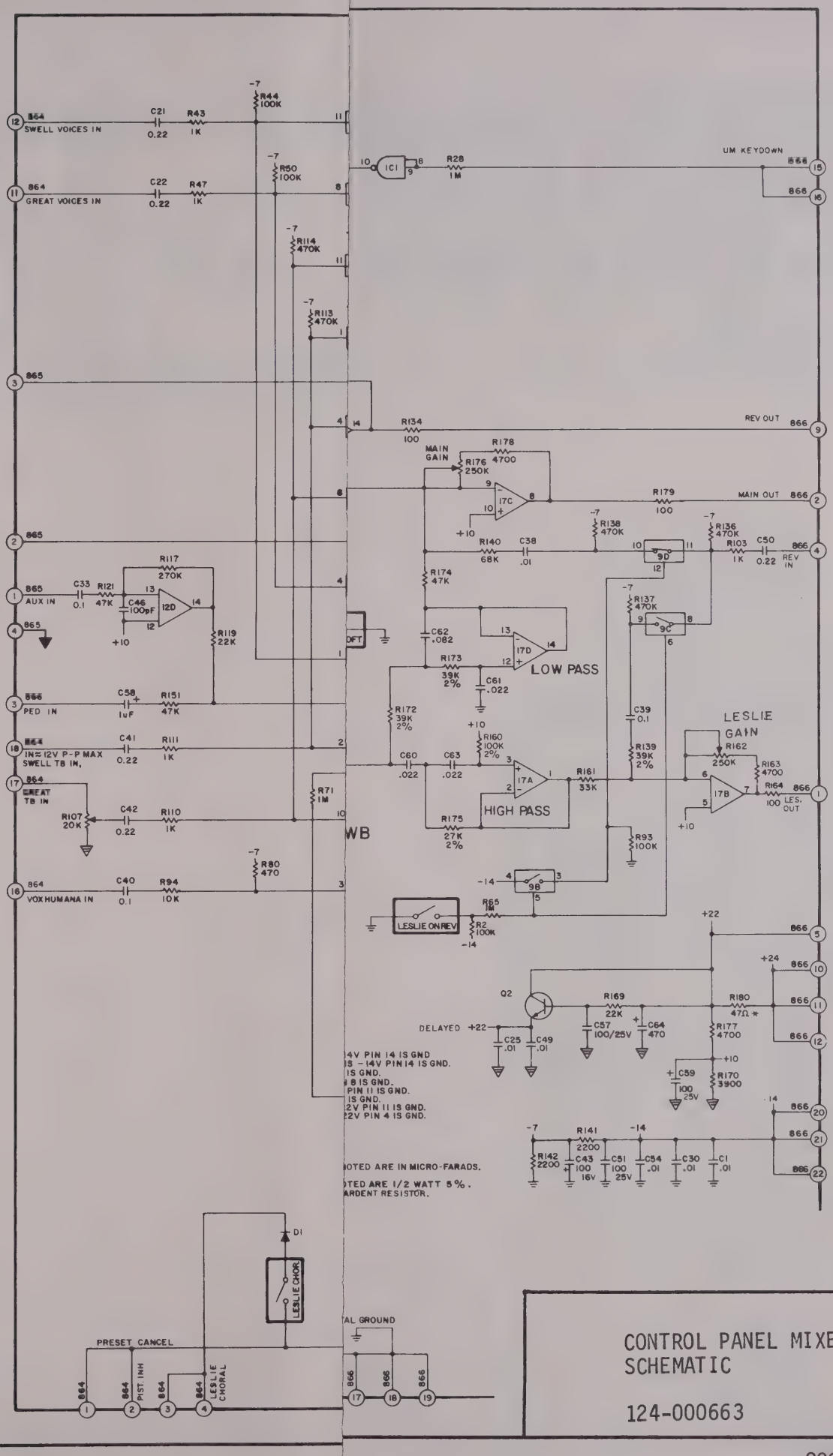
124-000662



UNIVERSAL PRESET
COPPER & LEGEND

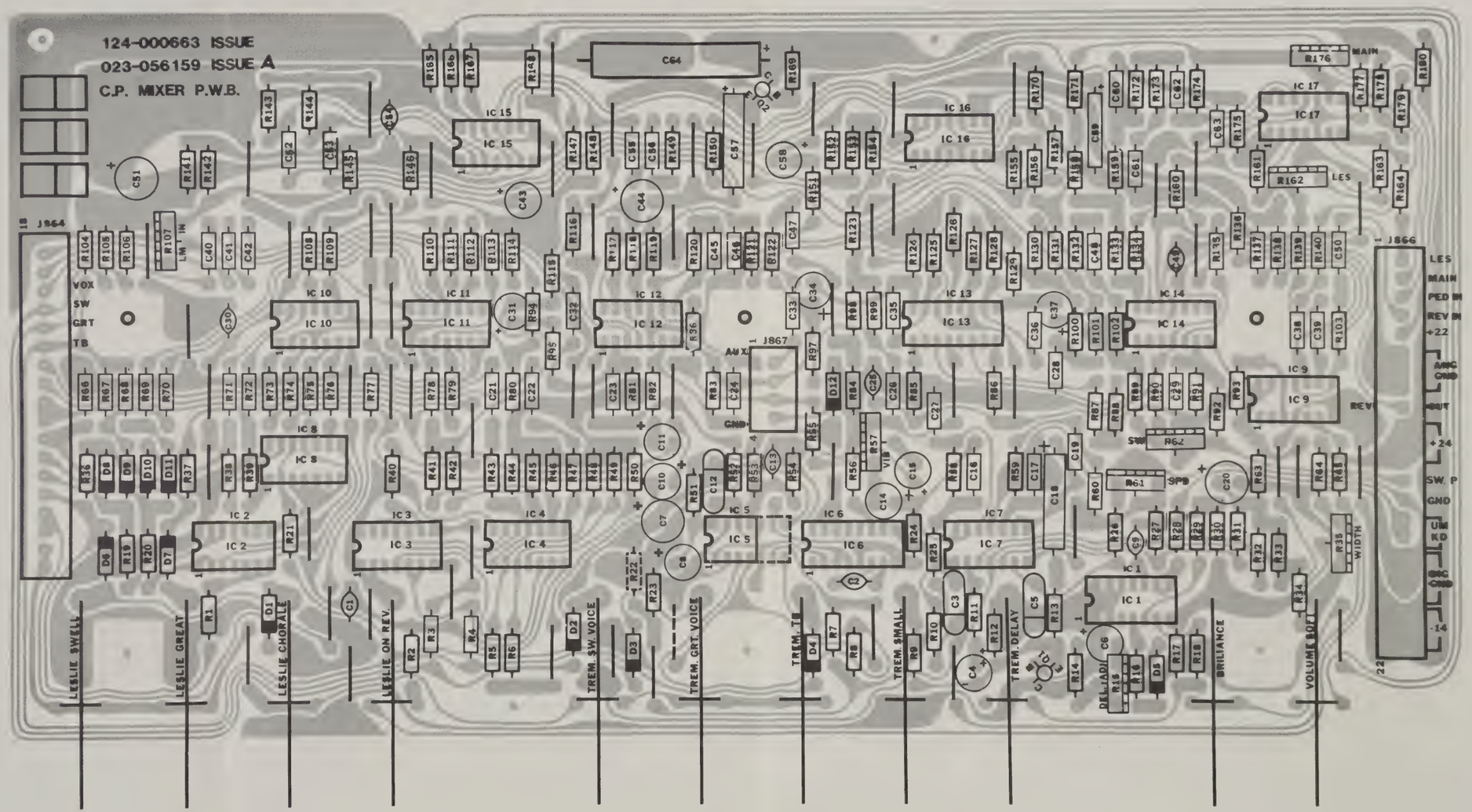
124-000662


TREM. TB
TREM. SMALL
TREM. DELAY
BRILIANCE
VOLUME SOFT
WIDTH
VIB
SPEED
REV
LES
MAIN
IC 1
IC 6
IC 7
IC 9
IC 13
IC 14
IC 16
IC 17
J866
-14
SW. P
+24
+22
REV IN
PED IN
MAIN
LES



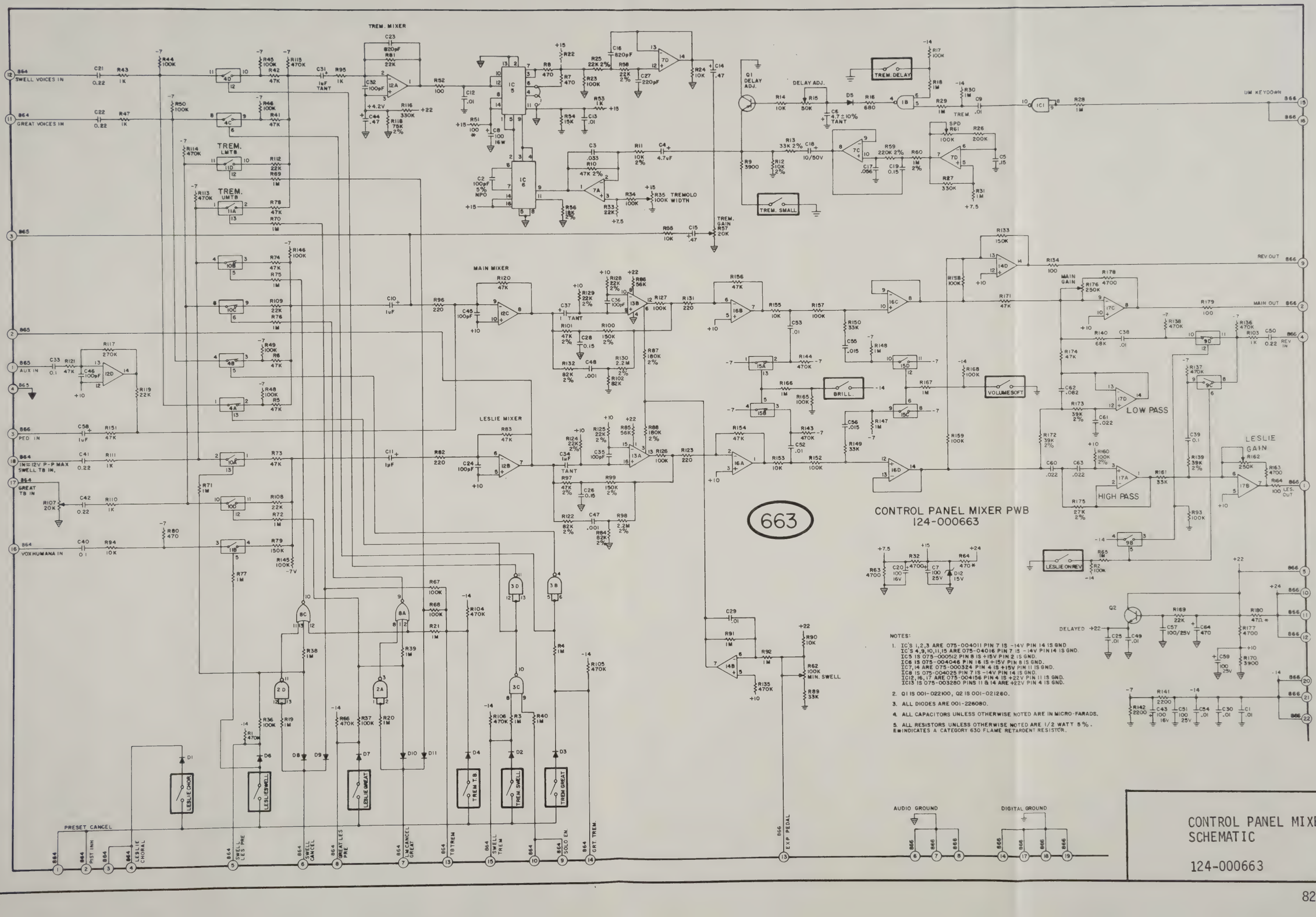
CONTROL PANEL MIXER
SCHEMATIC

124-000663



CONTROL PANEL MIXER
COPPER & LEGEND

124-000663

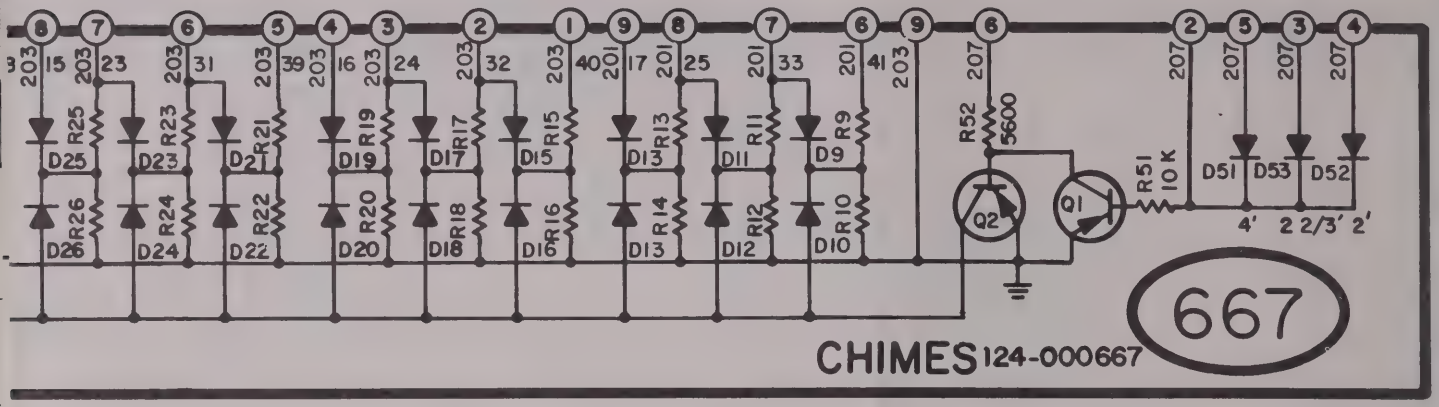


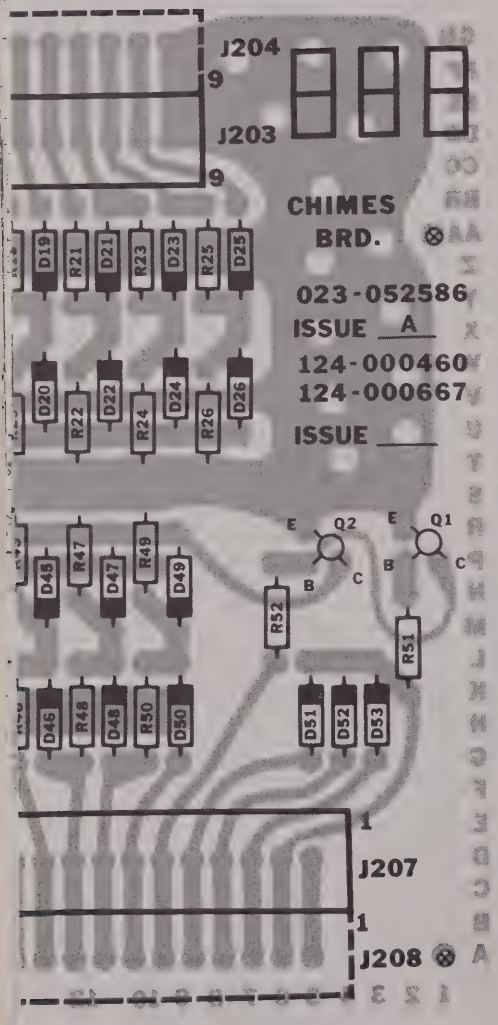
NOTES:

1. IC'S 1,2,3 ARE 075-004011 PIN 7 IS -14V PIN 14 IS GND
   IC'S 4,9,10,11,15 ARE 075-04016 PIN 7 IS -14V PIN14 IS GND.
   IC5 IS 075-000512 PIN 8 IS +15V PIN 2 IS GND.
   IC6 IS 075-004046 PIN 16 IS +15V PIN 8 IS GND.
   IC7,14 ARE 075-000324 PIN 4 IS +15V PIN 11 IS GND.
   IC8 IS 075-004025 PIN 7 IS -14V PIN 14 IS GND.
   IC12,16,17 ARE 075-004156 PIN 4 IS +22V PIN 11 IS GND.
   IC13 IS 075-003280 PINS 11 & 14 ARE +22V PIN 4 IS GND.
2. Q1 IS 001-022100, Q2 IS 001-021260.
3. ALL DIODES ARE 001-226080.
4. ALL CAPACITORS UNLESS OTHERWISE NOTED ARE IN MICRO-FARADS.
5. ALL RESISTORS UNLESS OTHERWISE NOTED ARE 1/2 WATT 5%.
   R*INDICATES A CATEGORY 630 FLAME RETARDENT RESISTOR.

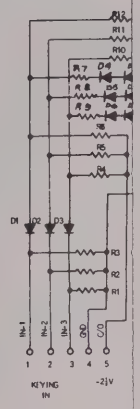
CONTROL PANEL MIXER SCHEMATIC

124-000663


R25
R23
R21
R19
R17
R15
R13
R11
R9
R52
5600
R51
10 K
D25
D23
D21
D19
D17
D15
D13
D11
D9
D51
D53
D52
R26
R24
R22
R20
R18
R16
R14
R12
R10
D26
D24
D22
D20
D18
D16
D13
D12
D10
Q2
Q1
4'
2 2/3'
2'
CHIMES 124-000667
667


J204
9
J203
9
CHIMES
BRD.
023-052586
ISSUE A
124-000460
124-000667
ISSUE
Q2
Q1
E
B
C
R52
R51
D45
R47
D47
R49
D49
D46
R46
D48
R50
D50
D51
D52
D53
1
J207
1
J208

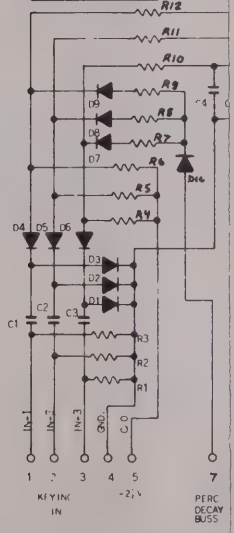
TYPICAL



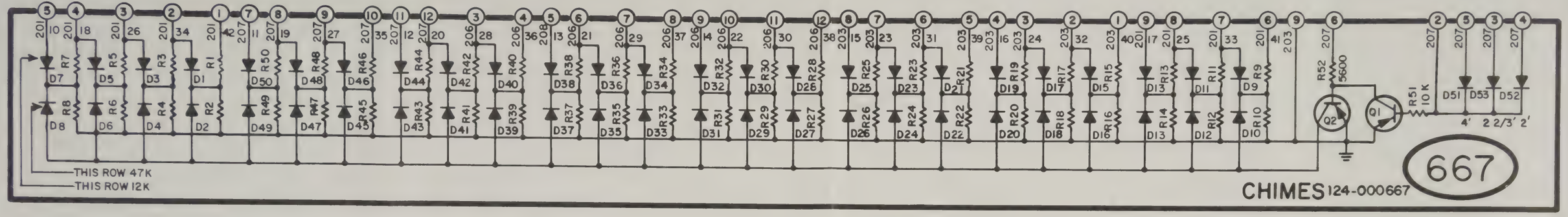
TYPICAL PRINT
(p

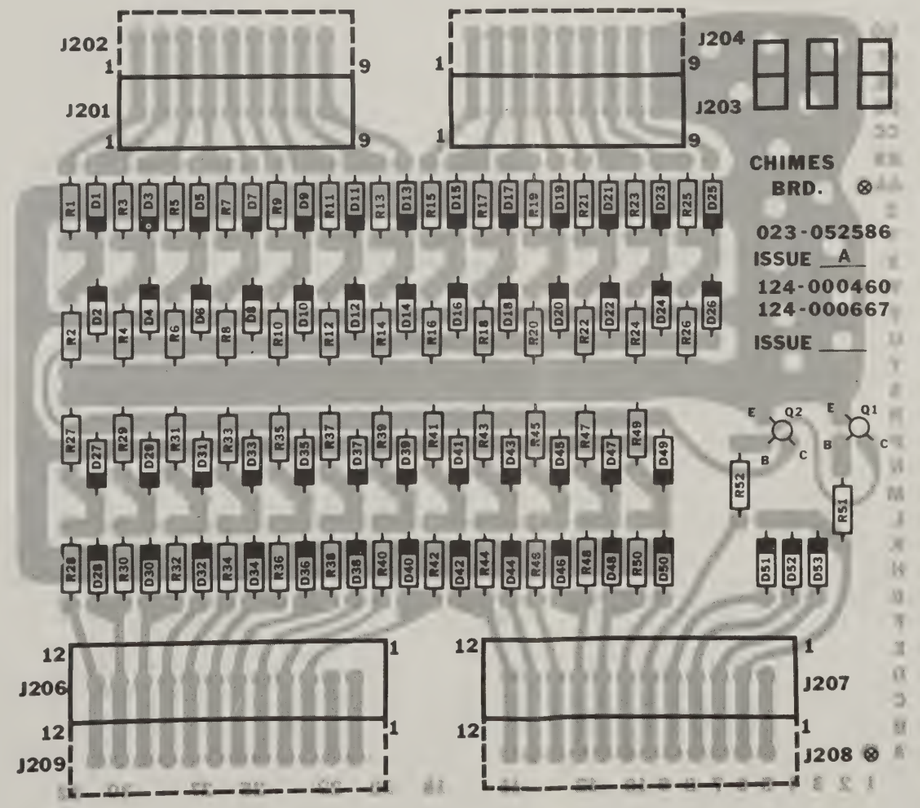
CAP	124720	124 719
C1	22	15
C2	22	10
C3	22	068
C4	047	05
C5	047	022
C6	047	033

24-000 72
PERCUSSION
124-000 7/9
PERCUSSION

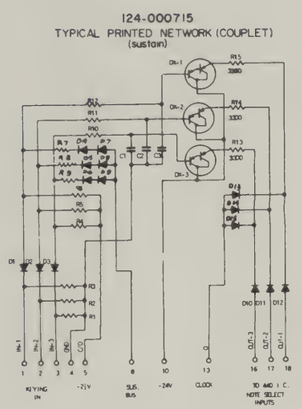


SUSTAIN KEYER COUPLATES
PERC KEYER COUPLATES
SCHEMATICS
COPPERS & LEGENDS
124-000715, 719, 720



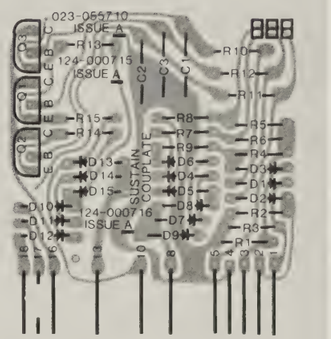


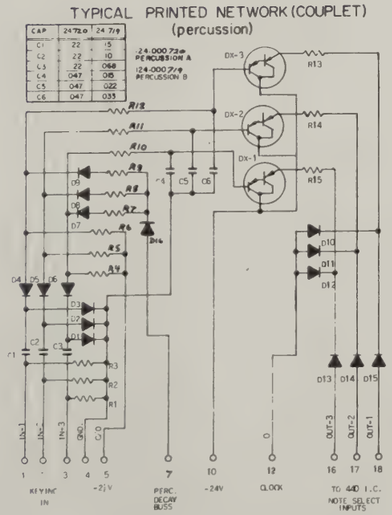
CHIMES
SCHEMATIC
COPPER & LEGEND
124-000667



124-000715 SUSTAIN COUPLATE PWB
(REPLACES 124-000605 OR 054-054315 COUPLATES)

Q1-Q3	TRANSISTOR	001-022103
D1-D15	SIG DIODE	001-226080
C1-C3	CAP .22 MFD	438-210292



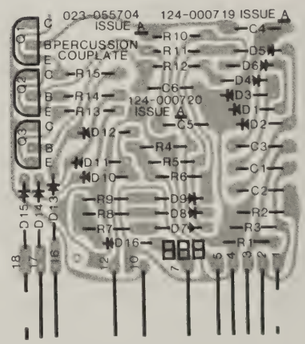


124-000719 PERC B COUPLATE PWB
(REPALCES 124-000607 OR 058-054319 COUPLATES)

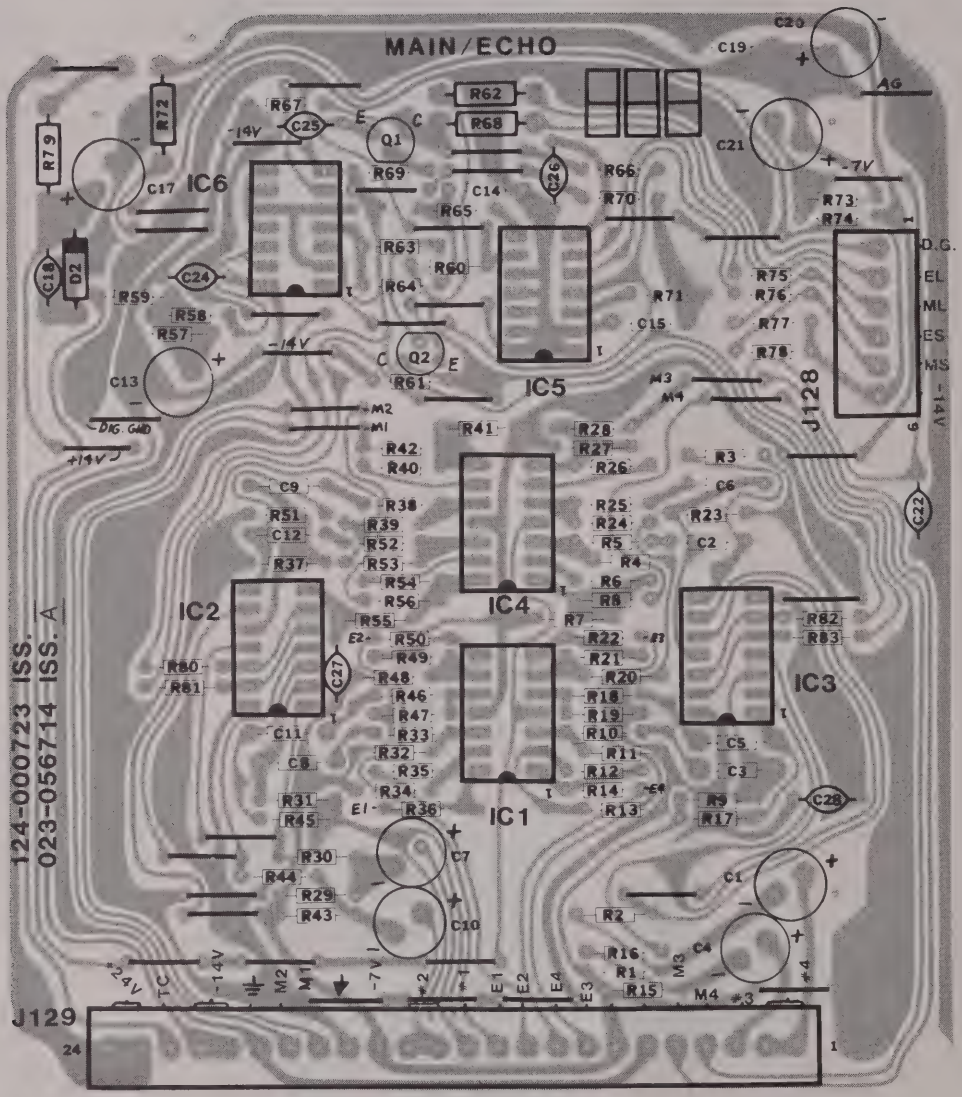
Q1-Q3	TRANSISTOR	001-022103
D1-D16	SIG DIODE	001-226080
C1	CAP .15 MFD	438-210272
C2	CAP .10 MFD	438-210252
C3	CAP .068 MFD	438-210232
C4	CAP .015 MFD	438-210152
C5	CAP .022 MFD	438-210172
C6	CAP .033 MFD	438-210192

124-000720 PERC A COUPLATE PWB
(REPALCES 114-000606 OR 058-054320 COUPLATES)

Q1-Q3	TRANSISTOR	001-022103
D1-D16	SIG DIODE	001-226080
C1-C3	CAP .22 MFD	438-210292
C4-C6	CAP .047 MFD	438-210212



SUSTAIN KEYER COUPLATES
PERC KEYER COUPLATES
SCHEMATICS
COPPERS & LEGENDS
124-000715, 719, 720


MAIN/ECHO
124-000723 ISS. A
023-056714 ISS. A
IC1
IC2
IC3
IC4
IC5
IC6
J128
J129
D.G.
EL
ML
ES
MS
-14V
AG
-7V
DIG. GND
+14V
-24V
TC
M1
M2
M3
M4
E1
E2
E3
E4
#1
#2
#3
#4
Q1
Q2
C1
C2
C3
C4
C5
C6
C7
C9
C10
C11
C12
C13
C14
C15
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
D2
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
R41
R42
R43
R44
R45
R46
R47
R48
R49
R50
R51
R52
R53
R54
R55
R56
R57
R58
R59
R60
R61
R62
R63
R64
R65
R66
R67
R68
R69
R70
R71
R72
R73
R74
R75
R76
R77
R78
R79
R80
R81
R82
R83

SECTION VI
PARTS LIST

PARTS ORDERING INFORMATION

When ordering replacement parts from the Hammond Organ Company, the following guidelines should be observed:

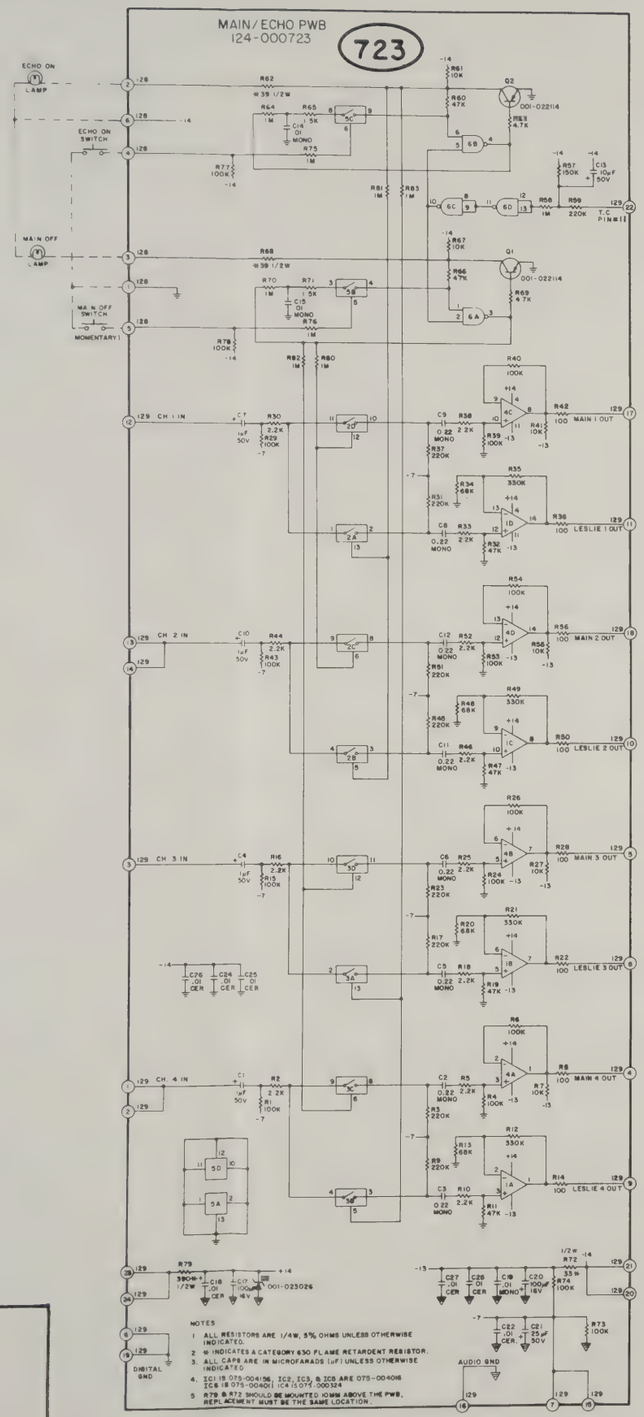
1) Address all parts orders to:

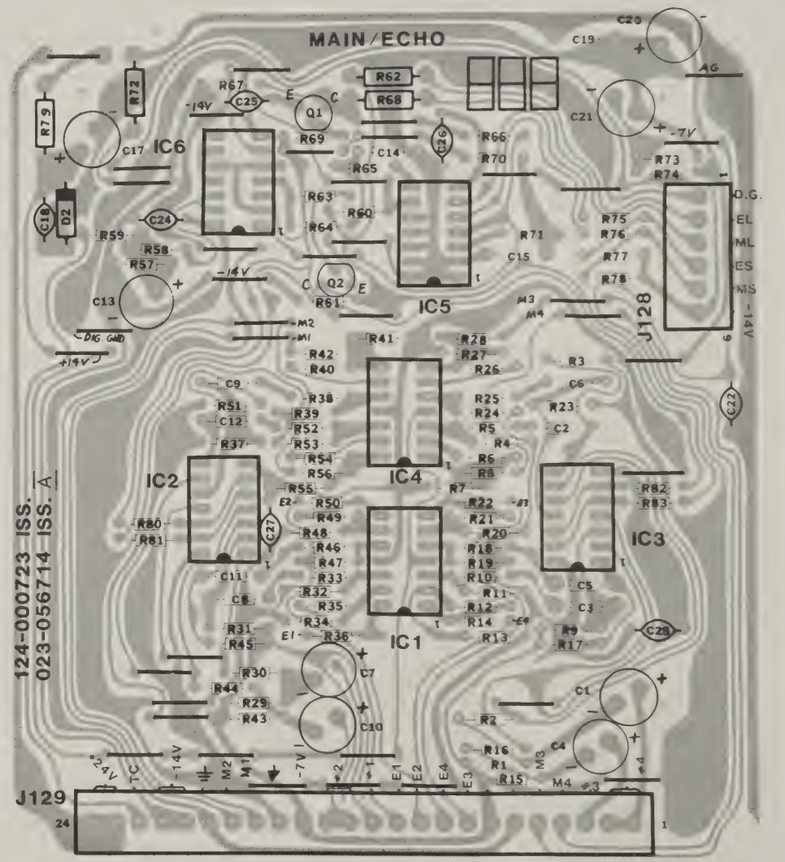
HAMMOND ORGAN COMPANY
PARTS DEPARTMENT
4200 W. DIVERSEY
CHICAGO, IL. 60639

2) All orders should specify the model and serial numbers of the instrument that is being serviced. (Note: On late model instruments the model and serial numbers are printed on the tag attached to the underside of the organ keyboard.)

3) All orders should specify the Hammond part numbers of the desired parts.

4) All orders should provide a specific description of the desired parts. (For example: Power transformer, 15 volt zener diode, F through B key module, etc.)


MAIN/ECHO PWB
124-000723
723
ECHO ON LAMP
ECHO ON SWITCH
MAIN OFF LAMP
MAIN OFF SWITCH MOMENTARY
CH 1 IN
CH 2 IN
CH 3 IN
CH 4 IN
MAIN 1 OUT
MAIN 2 OUT
MAIN 3 OUT
MAIN 4 OUT
LESLIE 1 OUT
LESLIE 2 OUT
LESLIE 3 OUT
LESLIE 4 OUT
001-022114
001-023026
T.C PIN#11
DIGITAL GND
AUDIO GND
NOTES
1 ALL RESISTORS ARE 1/4W, 5% OHMS UNLESS OTHERWISE INDICATED.
2 # INDICATES A CATEGORY 630 FLAME RETARDENT RESISTOR.
3. ALL CAPS ARE IN MICROFARADS (uF) UNLESS OTHERWISE INDICATED.
4. IC1 IS 075-004156, IC2, IC3, & IC6 ARE 075-004016 IC6 IS 075-004011 IC4 IS 075-000324
5 R79 & R72 SHOULD BE MOUNTED 10MM ABOVE THE PWB. REPLACEMENT MUST BE THE SAME LOCATION.



MAIN/ECHO
SCHEMATIC
COPPER & LEGEND
124-000723

SECTION VI
PARTS LIST

PARTS ORDERING INFORMATION

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PARTS DEPARTMENT
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2) All orders should specify the model and serial numbers of the instrument that is being serviced. (Note: On late model instruments the model and serial numbers are printed on the tag attached to the underside of the organ keyboard.)

3) All orders should specify the Hammond part numbers of the desired parts.

4) All orders should provide a specific description of the desired parts. (For example: Power transformer, 15 volt zener diode, F through B key module, etc.)

PARTS LIST EXPLANATION

This parts list begins by listing all the major assemblies (designated by a ◯) and their part numbers on pages 6-5 thru 6-7. Major assembly breakdowns are then listed numerically (①, ②, ③, etc. . .) on the on the following pages. The format for which major assemblies are broken down is shown below.

⑥ Major Assembly

1 Minor Assembly
2 " "
3 " "
.
.
.

a Component of Minor Assembly
b " " " "
c " " " "

i Sub-Component
ii "
iii "

Example:

⑥	Lower Keyboard Assembly	119-000095
1	Preset Key Module	057-054157
2	Preset Key Module	057-054156
3	Key Module	057-054077-005
.		
.		
.		
37	Visual Memory Cancel Assembly	060-053454-001
a	Spring	012-028799
b	Grommet	043-053308
.		
.		
.		
m	Screw	999-054489
i	Washer	999-000810

PWB Assemblies are symbolized by ⬭ and are listed in numerical order following the Major Assembly breakdowns.

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MODEL 820165 SERIES

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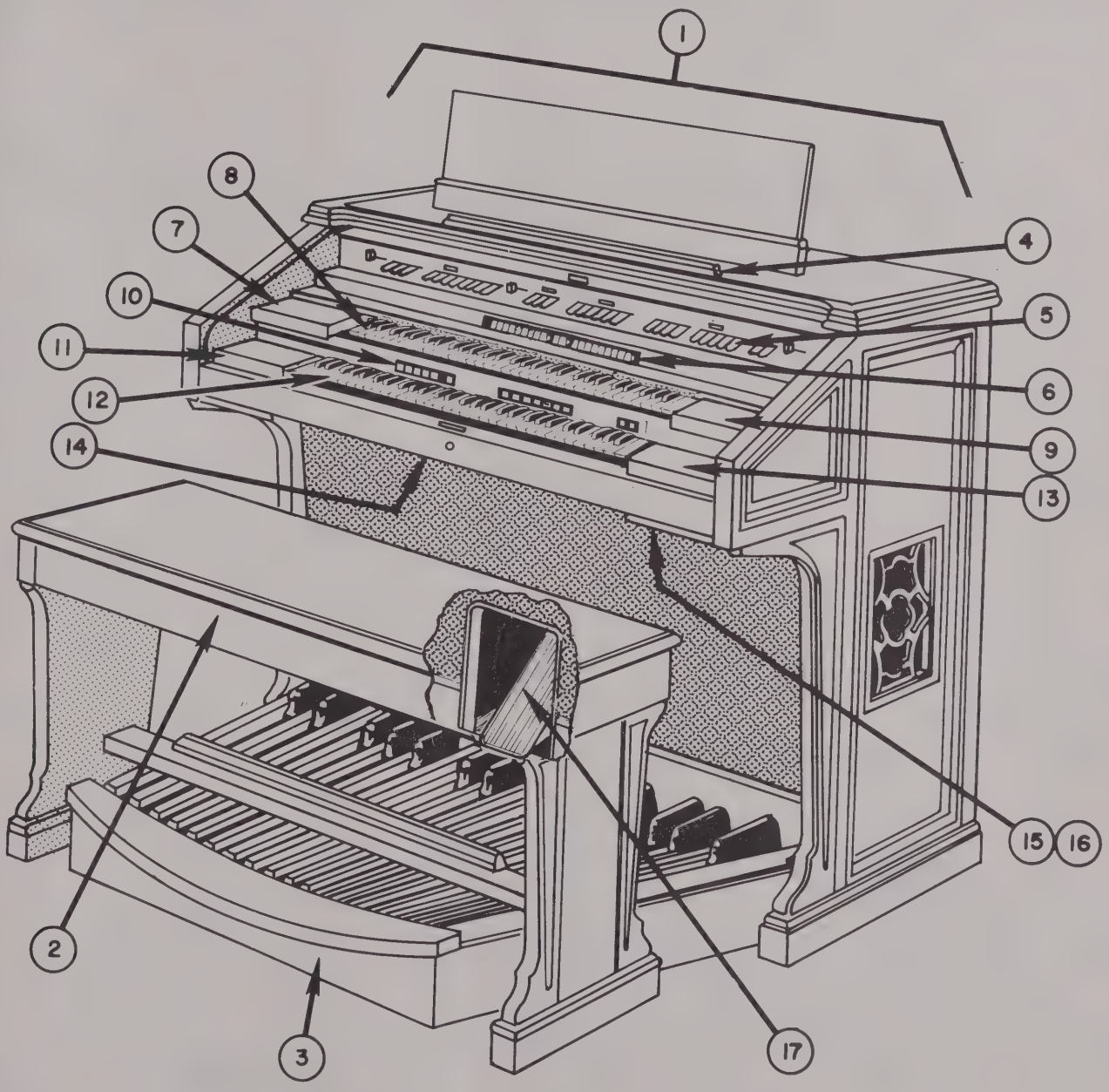
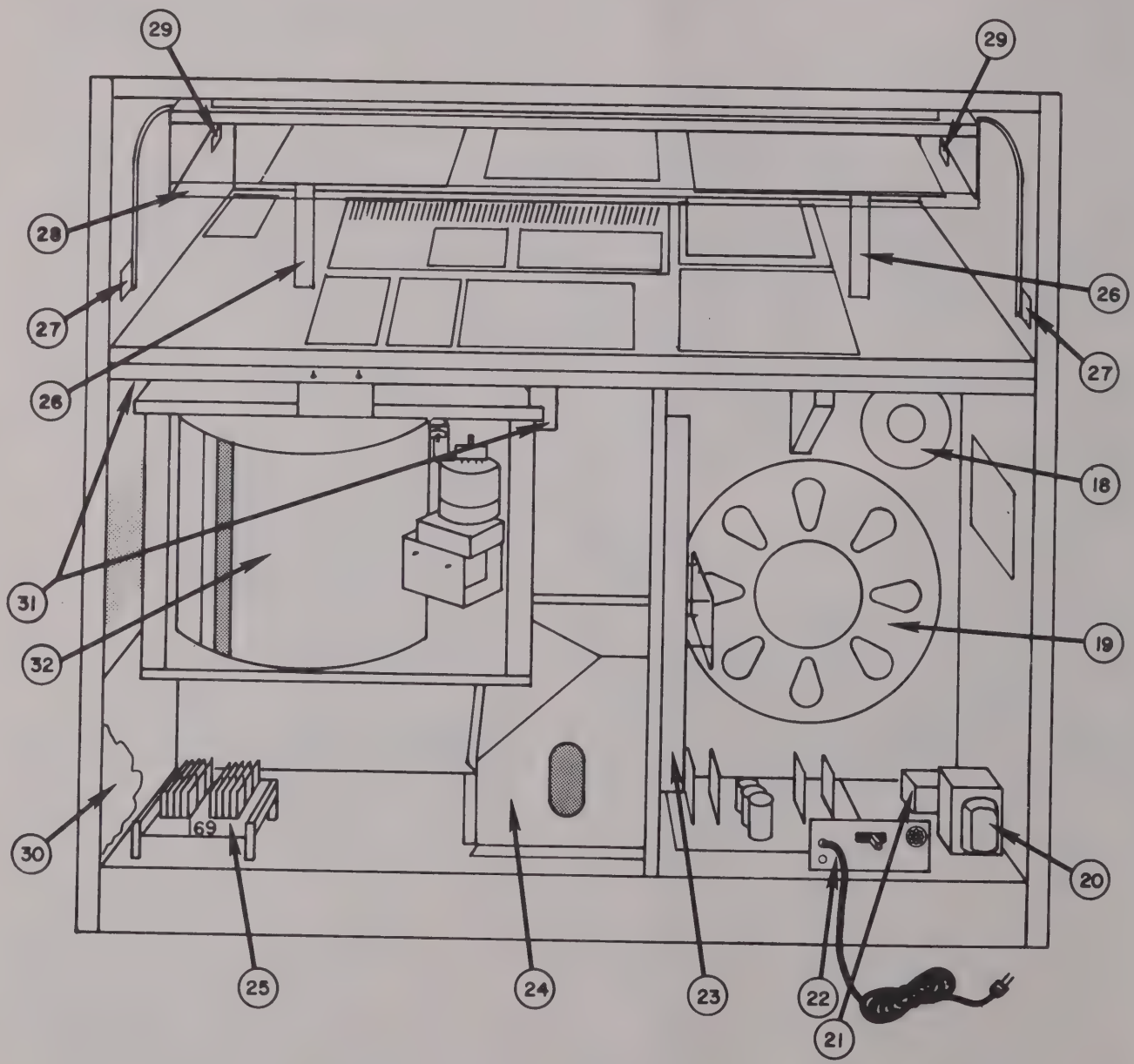
P.W.B. ASSEMBLIES

(P.W.B. Assemblies are listed in sequential order beginning on Page 6-20)

1	CABINET ASSEMBLY	111-820165
2	BENCH ASSEMBLY	152-820165
3	PEDAL KEYBOARD ASSEMBLY	153-000029
4	MUSIC AND CONTROL LIGHT ASSEMBLY	
	MUSIC DESK LIGHT ASSEMBLY	063-055330
	COVE LIGHT (LIGHT TUBE) ASSEMBLY	063-056084
5	CONTROL PANEL ASSEMBLY	120-000133
6	STOPSWITCH BASE ASSEMBLY (TONE BAR ASY)	120-000135
7	UPPER LEFT HAND END BLOCK	050-005036
8	UPPER KEYBOARD ASSEMBLY	119-000096
9	UPPER RIGHT END BLOCK ASSEMBLY	050-005036
10	FRONT STRIP ASSEMBLY	120-000134-001
11	LOWER LEFT HAND END BLOCK	050-005036
12	LOWER KEYBOARD ASSEMBLY	119-000097
13	LOWER RIGHT HAND END BLOCK	050-005036
14	PEDAL LIGHT ASSEMBLY	016-051360
15	HEADPHONE JACK	005-049363
16	AUXILIARY JACK	005-028532
17	EXPRESSION PEDAL ASSEMBLY	123-000101

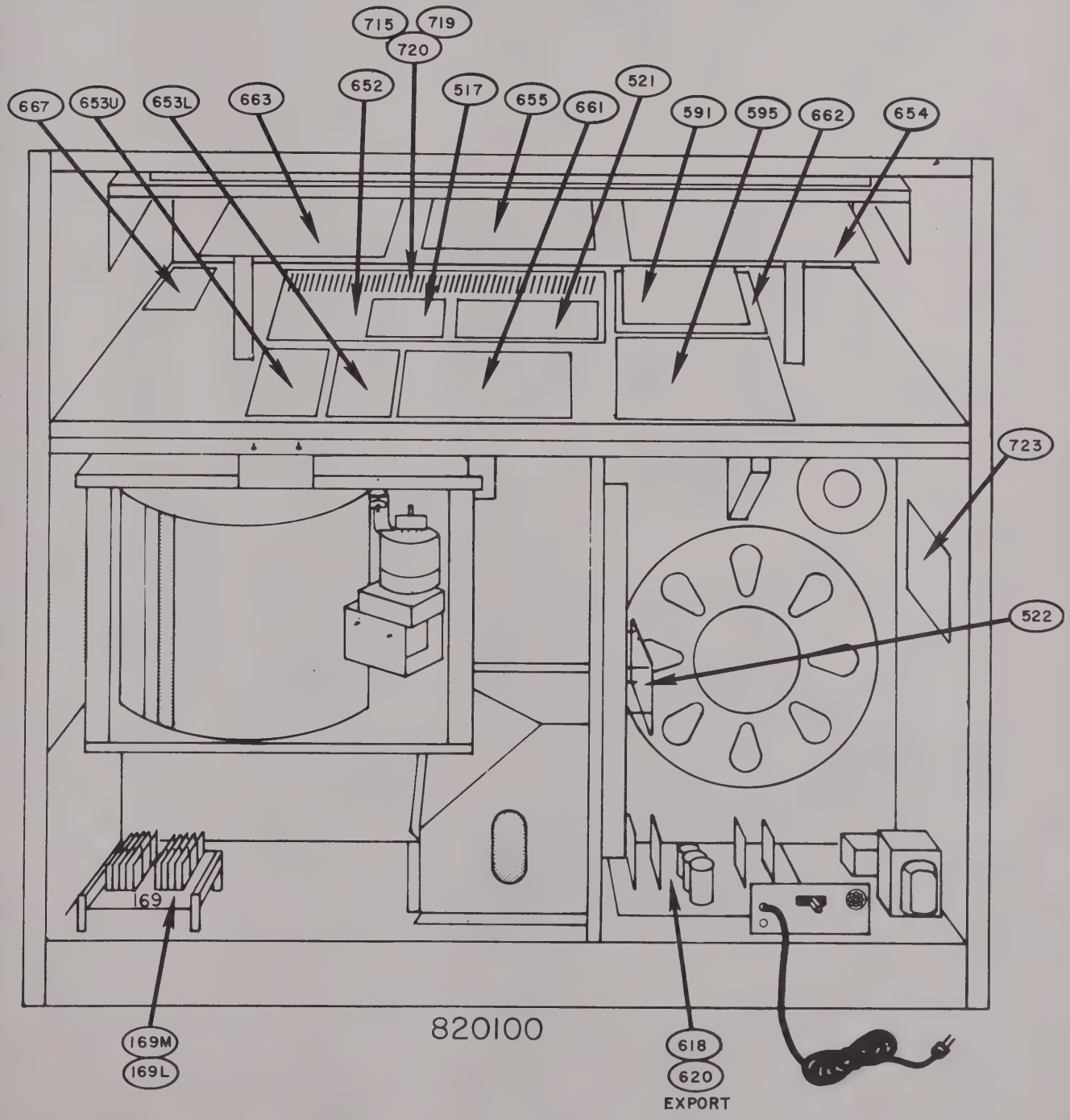


(18)	SPEAKER 6-1/2" MAIN	014-045827
(19)	SPEAKER 15" MAIN	014-046438
(20)	POWER TRANSFORMER ASSEMBLY	
	DOMESTIC 120V/60HZ	003-055539
	EXPORT 220V/50HZ	003-055540
(21)	LIGHT TRANSFORMER ASSEMBLY	003-055541
(22)	MOUNTING BRACKET	035-055114
(23)	REVERB ASSEMBLY WITH P.W.B.	121-000214
(24)	EXPRESSION PEDAL HOUSING	046-054758
(25)	AMPLIFIER ASSEMBLY	126-000132
(26)	KEYBOARD SUPPORT BRACKET	
	RIGHT HAND	035-045690
	LEFT HAND	035-045689
(27)	STOP BLOCK (2 USED)	050-004280
(28)	SUPPORT ANGLE	035-055781
(29)	CONTROL RAIL SUPPORT BLOCKS (2 USED)	050-005037
(30)	BACK PANEL ASSEMBLY	050-004959
(31)	TREMOLO MOUNTING BLOCKS	
	FRONT	050-004726
	RIGHT (WEDGE GROOVED)	050-004728
	LEFT (WEDGE GROOVED)	050-004727
(32)	ROTARY TREMOLO UNIT	
	DOMESTIC 120V/60HZ	121-000212-001
	EXPORT 115V/50HZ	121-000212-002

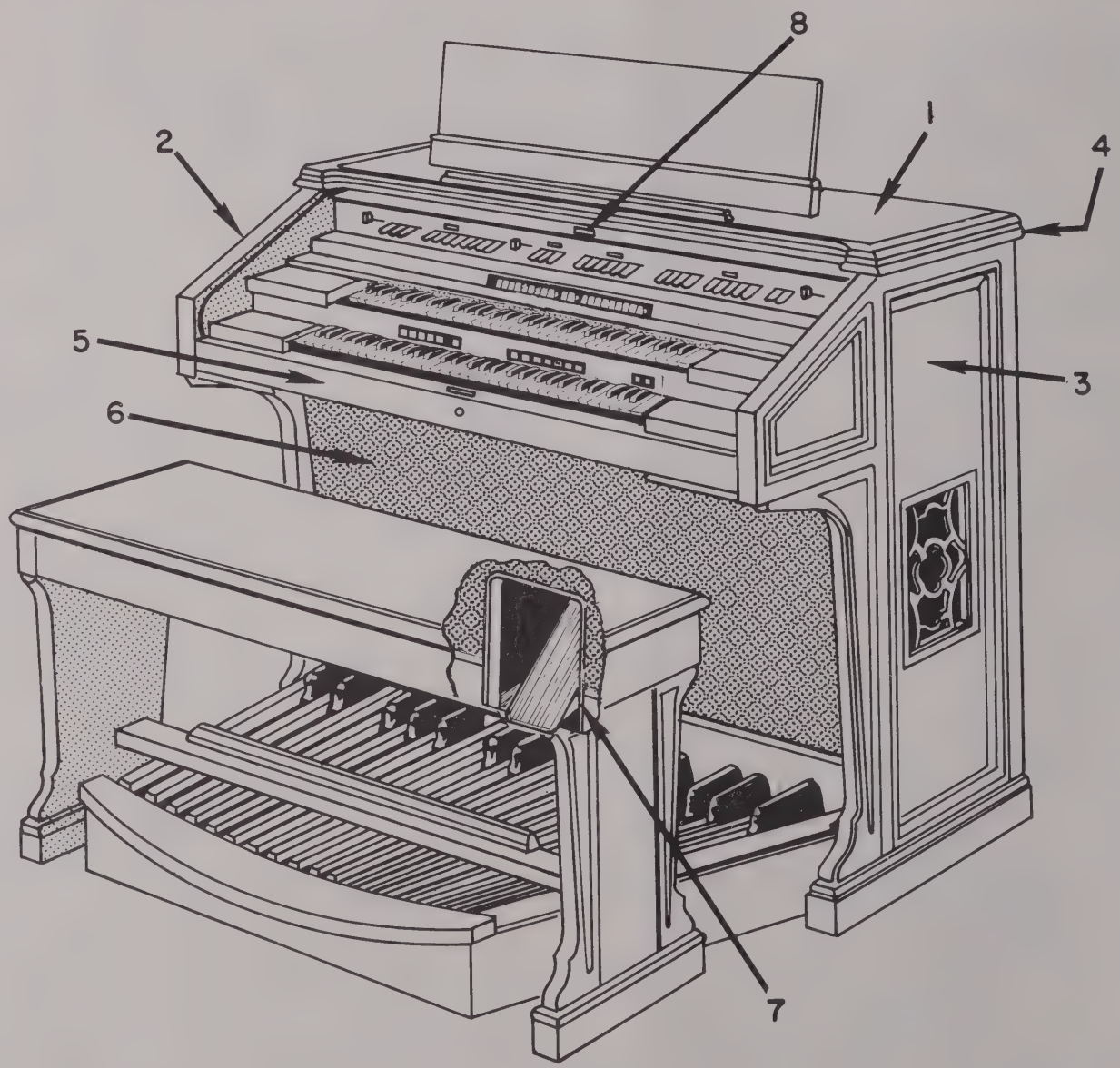


P.W.B. ASSEMBLIES

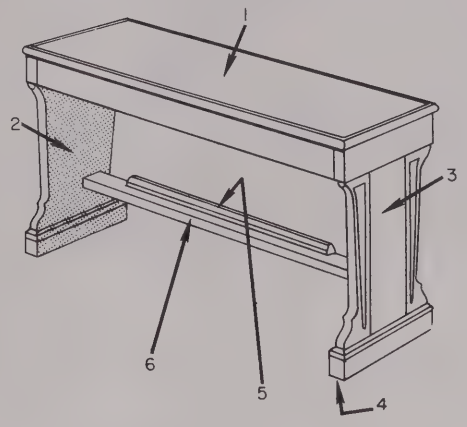
169	35 WATT POWER AMP P.W.B. (MAIN & LESLIE)	124-000169
517	TRANSPOSER P.W.B.	124-000517
521	DEMULTIPLEX P.W.B.	124-000521
522	REVERB AMP P.W.B.	124-000522
591	MULTIPLEX P.W.B.	124-000591
595	LOGIC P.W.B.	124-000595
618	POWER SUPPLY P.W.B. (DOMESTIC)	124-000618
620	POWER SUPPLY P.W.B. (EXPORT)	124-000620
652	GENERATOR P.W.B.	124-000652
653	SINE FILTER P.W.B. (UPPER & LOWER)	124-000653
654	UPPER KEYBOARD VOICE P.W.B.	124-000654
655	LOWER KEYBOARD VOICE P.W.B.	124-000655
661	STAIRSTEP PEDAL P.W.B.	124-000661
662	UNIVERSAL PRESET P.W.B.	124-000662
663	CONTROL PANEL MIXER P.W.B.	124-000663
667	CHIMES P.W.B.	124-000667
715	SUSTAIN COUPLET P.W.B.	124-000715
719	PERCUSSION B COUPLET P.W.B.	124-000719
720	PERCUSSION A COUPLET P.W.B.	124-000720
723	MAIN/ECHO P.W.B.	124-000723



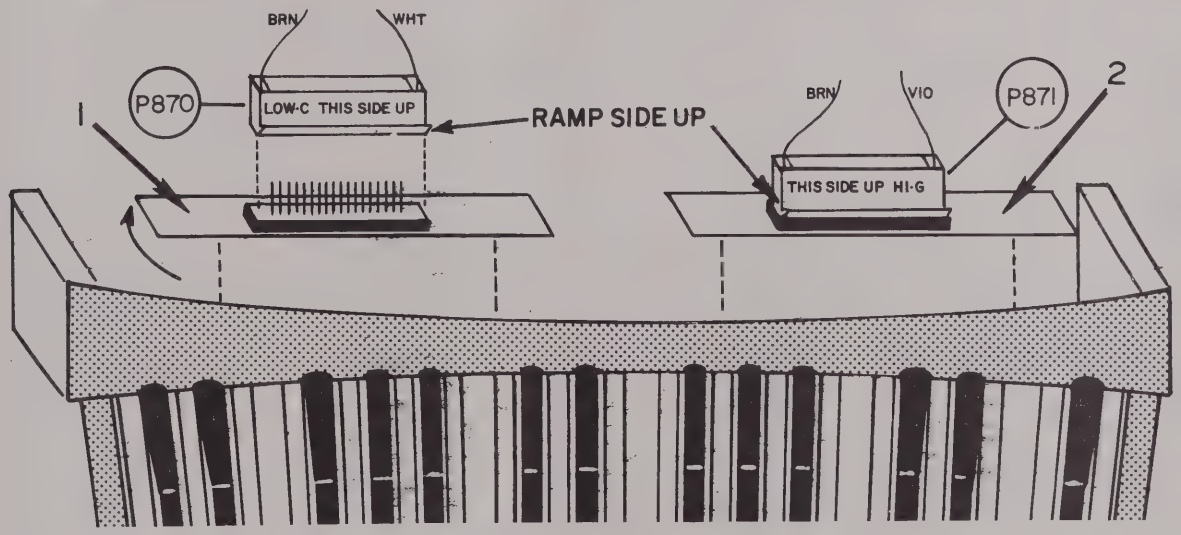
(1)	CABINET ASSEMBLY (FIGURE 1A)	111-820165	
1	TOP AND MUSIC PANEL ASSEMBLY	050-004951	
	a TOP PANEL ONLY	050-004952-001	
	i TOP PANEL INSERTS (2 USED)	999-016971	
	ii TOP PANEL SCREWS (2 USED)	827-081818	
	iii WASHERS (2 USED)	999-000066	
	iv KEY HOLE PLATE (2 USED)	035-051070	
	v SCREW (KEYHOLE PLATE (2 USED)	879-071838	
	b MUSIC PANEL	050-005040	
	i HINGE (2 USED)	032-033414	
	ii SCREW (HINGE) (10 USED)	882-030737	
	iii BUMPER (2 USED)	043-049938	
	iv GLASS PANEL	045-056563	
	v MUSIC PANEL BASE	050-005041	
	vi RETAINING STRIP	050-005042	
2	FULL END ASSEMBLY (LEFT HAND)	050-004960	
	a PILLASTER ASSY.	050-004982	
	b BASE FOOT	050-004985	
	c GLIDE	032-030741	
	d GRILLE	025-056373	
	i GRILLE CLOTH	052-056372	
3	FULL END ASSEMBLY (RIGHT HAND)	050-004961	
	a PILLASTER ASSY.	050-004983	
	b BASE FOOT	050-004986	
	c GLIDE	032-030741	
	d GRILLE	025-056373	
	i GRILLE CLOTH	052-056372	
4	TOP BACK RAIL	050-004993	
5	FRONT STATIONARY RAIL ASSEMBLY	050-004988	
	a LOCK	032-030626	
	b KEY	032-030629	
6	PANEL & GRILLE CLOTH ASSEMBLY	052-056440	
	a GRILLE CLOTH ONLY	053-056441	
7	BEZEL	055-054782	
8	ROLL TOP ASSEMBLY	050-004958	
	a STRIKE	032-030627	
	i STRIKE SCREWS	879-020717	
	b FELT FOOT (2 USED)	042-029555	

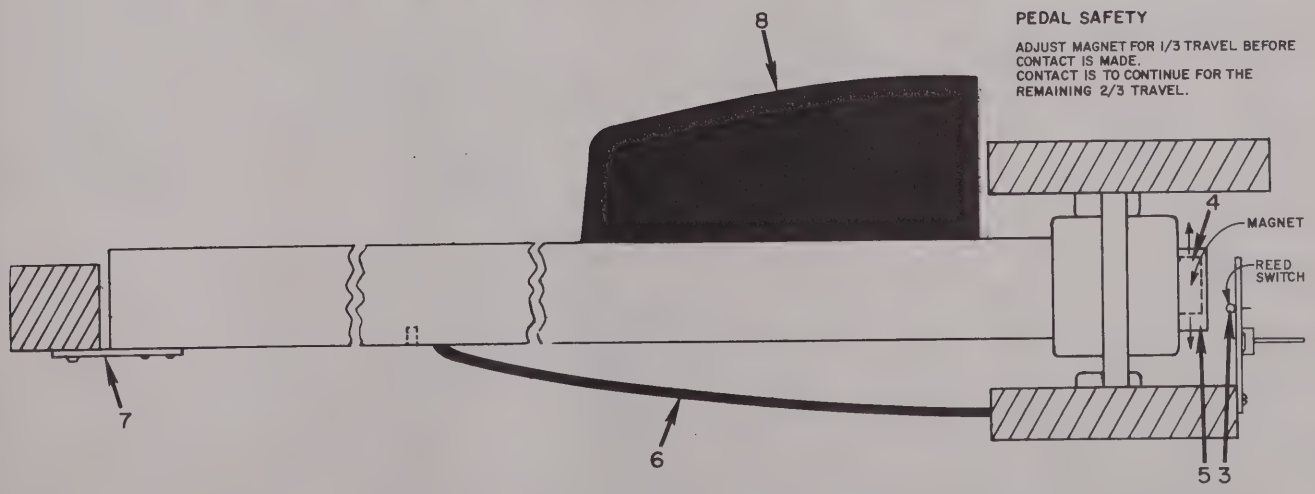


(2)	BENCH ASSEMBLY (FIGURE 2A)	152-820165
1	TOP PANEL	050-005009
2	END ASSEMBLY (LEFT HAND)	050-005002
a	FOOT ASSEMBLY	050-005006
3	END ASSEMBLY (RIGHT HAND)	050-005003
a	FOOT ASSEMBLY	050-005006
4	GLIDE (4 USED)	032-030741
5	HEEL REST	050-005011
6	STRETCHER	050-005010



(3)	PEDAL KEYBOARD ASSEMBLY	153-000029
1	LOW "C" P.W.B. SWITCH ASSEMBLY	008-010003
2	HIGH "G" P.W.B. SWITCH ASSEMBLY	008-010004
3	REED SWITCH	008-010002
4	REED SWITCH MAGNET	008-010001
5	MAGNET HOLDER	012-010001
6	ROUND PEDAL SPRING	012-010002
7	FLAT PEDAL PIVOT SPRING	012-010003
8	BLACK PEDAL CAP (SHARPS)	025-010001





(4) MUSIC AND CONTROL LIGHT ASSEMBLIES (FIGURE 4a)

1	MUSIC DESK LIGHT ASSEMBLY	063-055330
a	BULB GE #194 14V/.27A (9 USED)	016-031753
b	SOCKET	004-055329
c	P.W.B.	023-055323
d	SCREW	885-051138
2	LIGHT TUBE ASSEMBLY	063-056084
a	BULB GE #73E 14V/.08A (17 USED)	016-054890
b	TUBE	034-052745-001
c	CORK STOPPER (2 USED)	013-056079
3	LENS	026-046367

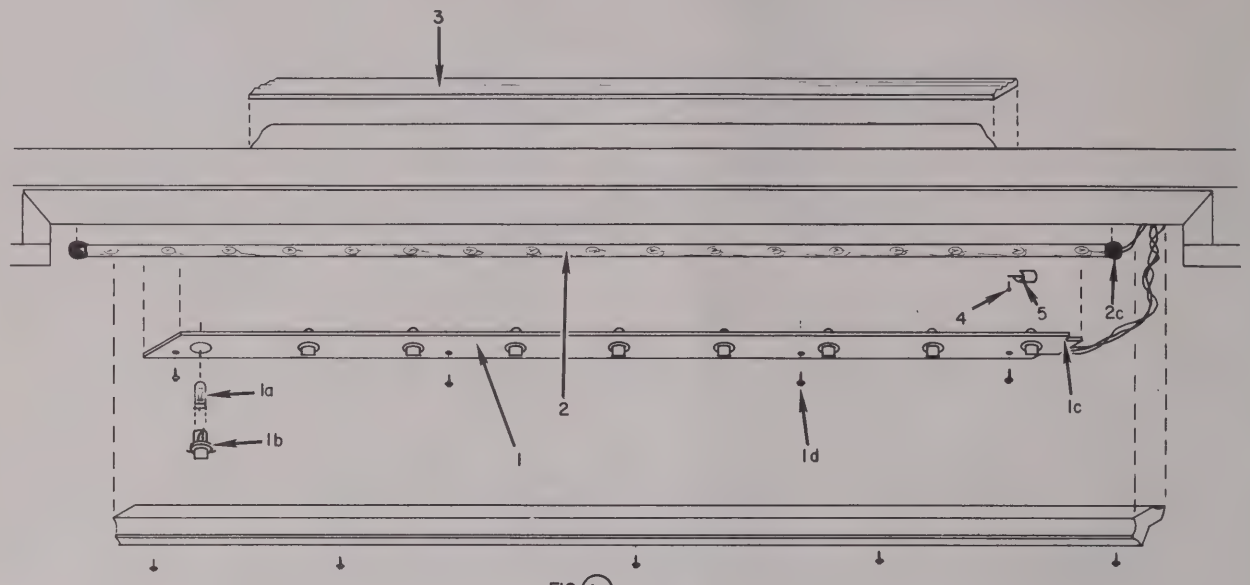


FIG. (4a)

(5) CONTROL PANEL ASSEMBLY (FIGURE 5a) 120-000133

1	CONTROL PANEL (SCREENED)	061-056228
2	SLIDE POTENTIOMETER	
a	SWELL (20K)	676-056194
b	PEDAL SUSTAIN (1MEG).....	676-056196
c	REVERB LEVEL (5K)	676-056193
i	SLIDE POT MTG BRACKET(3 USED)	035-053710
ii	FELT PAD (3 USED)	042-053136
iii	SCREWS	999-047801
3	KNOB (3 USED)	025-053145-001
4	LOGO	038-055342
a	KEEPS NUT (2 USED)	999-001260
5	PIVOT BRACKET (RIGHT HAND)	035-056324
	(LEFT HAND)	035-056323
a	PLUG BUTTON NYLON (2 USED)	025-053151
b	HINGE (2 USED)	032-051326
c	HINGE SCREW (2 PER HINGE)	940-060538
6	SCREW	999-047801
7	FELT STRIP	042-053175
8	CONTROL NAMEPLATE "SWELL"	038-056462-001
	"PEDAL"	038-056462-003
	"GREAT".....	038-056462-002
	"GENERAL"	038-056462-004
9	CONTROL TABS	
	HARP SOLO	031-056110-001
	CHIME SOLO	031-056110-002
	PIANO SOLO	031-056110-003

PRINCIPAL 16'.....	031-056110-009
GEIGEN PRINCIPAL 8'	031-056110-004
SALICIONAL 8'	031-056110-005
SPITZ PRINCIPAL 4'	031-056110-025
TROMPETTE 8'	031-056110-006
OBOE 8'	031-056110-007
VOX HUMANA 8'	031-056110-008
CLARION 4' (2 USED)	031-056110-026
SWELL SUSTAIN	031-056110-010
GREAT TO PEDAL	031-056110-028
PEDAL SUSTAIN	031-056110-011
PEDAL MUTE	031-056110-012
PRINCIPAL 8'	031-056110-013
OCTAVE 4'	031-056110-027
TRUMPET 8'	031-056110-014
GREAT TO GREAT 4'.....	031-056110-016
GREAT SUSTAIN	031-056110-024
LESLIE SWELL	031-056110-017
LESLIE GREAT	031-056110-018
LESLIE CHORALE	031-056110-019
LESLIE ON REVERB.....	031-056110-020
TREMOLO-SWELL VOICES	031-056110-029
TREMOLO-GREAT VOICES	031-056110-030
TREMOLO TONE BARS	031-056110-031
TREMOLO SMALL	031-056110-022
TREMOLO DELAY	031-056110-023
BRILLIANCE	031-056110-032
VOLUME SOFT	031-056110-033

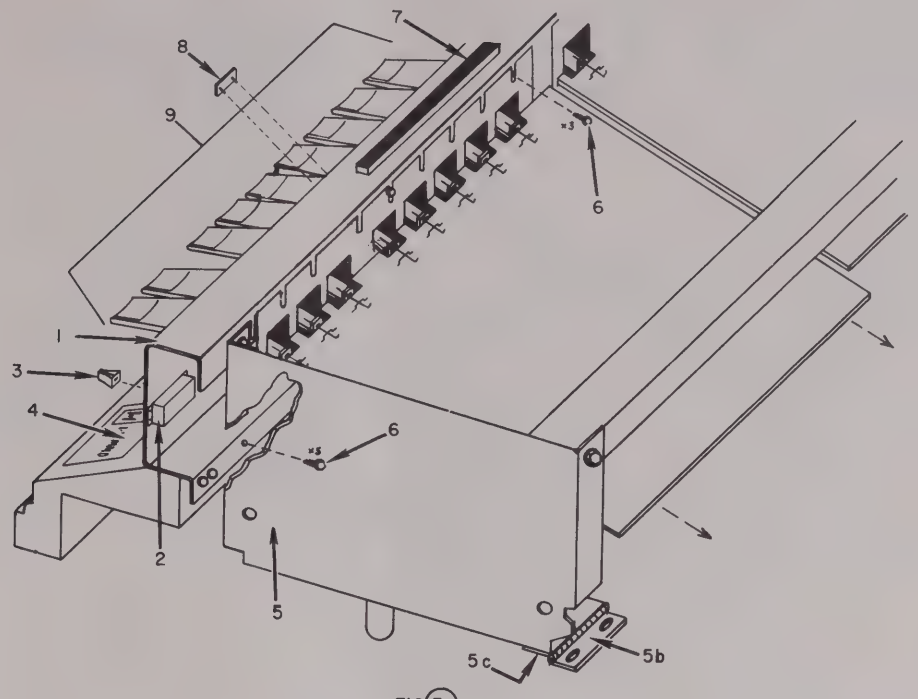


FIG 5a

10	COMPLETE CONTROL TAB ASSEMBLIES(FIG 5B)		
	3 STATION SOLO		060-056178-001
	9 STATION SWELL		060-056178-005
	3 STATION PEDAL	.....	060-056178-006
	6 STATION GREAT		060-056178-007
	10 STATION ANIMATION		060-056178-008
	2 STATION EFFECTS		060-056178-009
	PARTS COMMON TO TAB ASSEMBLIES		
11	DETENTE SPRING		012-043149
12	PIVOT SHAFT 3 1/4"		020-049677
	2 3/8"	.....	020-054628
	5 7/8"		020-054627
	6 3/4"		020-054624
	7 5/8"	.....	020-049680
	8 1/2"		020-054626
	9 3/8"		020-054625
13	LIMIT WIRE 3 1/4"		013-043160
	5 7/8"	.....	013-054632
	6 3/4"		013-054629
	7 5/8"		013-043163
	8 1/2"	.....	013-054631
	9 3/8"		013-054630
14	SUPPORT BRACKET (8 USED)		035-053709
	a SCREW		940-030538

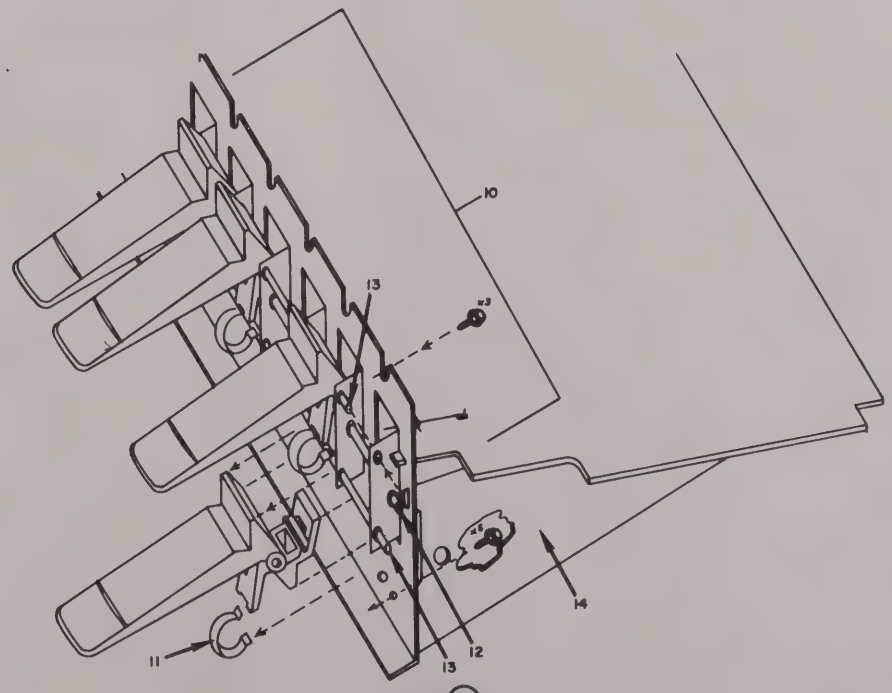


FIG. 5b

(6)	STOP SWITCH BASE ASSEMBLY (FIGURE 6a)	120-000135
1	U.K. & L.K. TONEBAR ASSEMBLY (SEE FIGURE 6b)	120-000070
2	PEDAL STOPSWITCH (TONEBAR) ASSM. (SEE FIGURE 6c)	120-000097
3	TONEBAR HOUSING CAP (2 USED)	025-053921
4	TONEBAR BASE (METAL).....	061-056309
5	TONEBAR BASE (WOOD)	050-005034
6	POWER SWITCH	008-051701

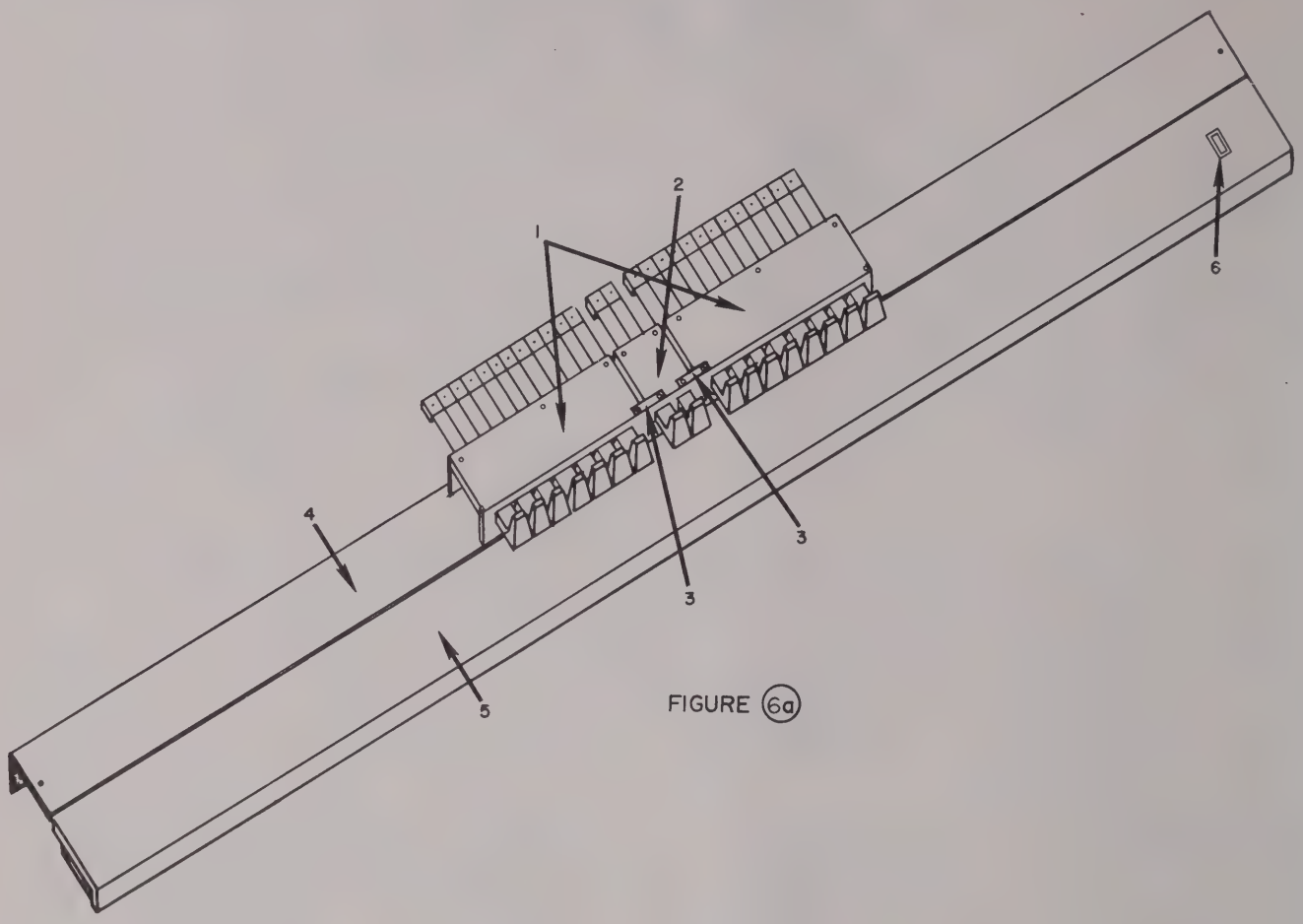


FIGURE (6a)

1	Upper and Lower Stopswitch (Tonebar Assembly) (See Fig. 6b)	120-000070
a	Mounting Block Assembly	063-049984
b	Mounting Screws	827-041718
i	Washer.....	999-000016
c	Clamp Spring	012-027613
d	Double End Terminal	007-046423
e	Printed Network	058-056092
f	Spring.....	012-051577
g	Wire Guides	006-045721
h	Screw	909-030534
i	Stop Slide	028-032049
j	Contact Spring Assembly.....	012-033221
k	Tonebar Stop	025-040198
l	Screw	939-010433
m	Stop Channel	025-027829
n	Knob.....16'.....(Beige).....	031-034347
o	Knob 5 1/3' (Beige)	031-034349
p	Knob 8' (Beige)	031-034348
q	Knob 4' (White)	031-034338
r	Knob.....2 2/3'.....(Black).....	031-034339
s	Knob 2' (Black)	031-034340
t	Knob 1 3/5" (Black)	031-034341
u	Knob 1 1/3' (Black)	031-034342
v	Knob.....1'.....(White).....	031-034343
w	Stopswitch Base (Metal)	041-055775
x	Tap Screw	940-030538

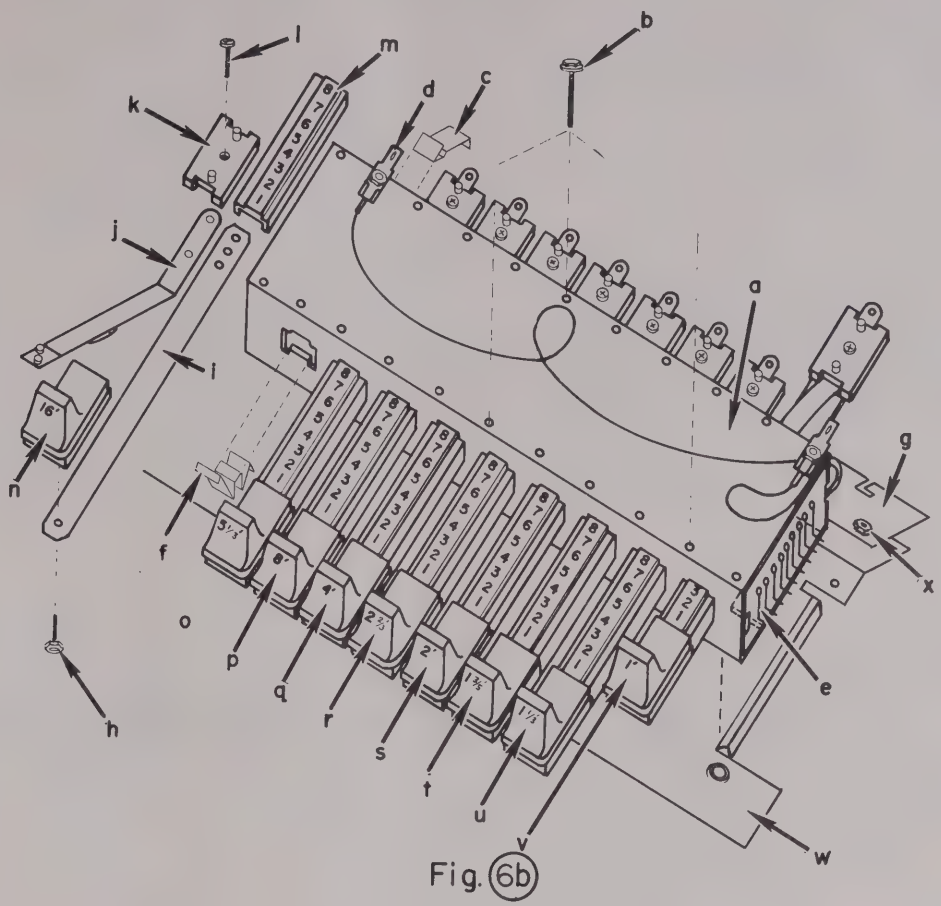


Fig. 6b

2	Pedal Stopswitch (Tonebar Assembly) (See Figure 6c)		120-000097
	a	Mounting Screw	827-041538
	b	Stop Channel	025-027829
	c	Screw	939-010433
	d	Drawbar Stop	025-040198
	e	Contact Spring Assembly	012-033221
	f	Knob 8' (Beige)	031-034348
	g	Stop Slide	028-032049
	h	Screw	909-030534
	i	Spring	012-051577
	j	Knob 16' (Beige)	031-034347
	k	Printed Network	058-056092
	l	Mounting Block Assembly	063-053818
	m	Double End Terminal	007-046423
	n	Clamp Spring	012-027613

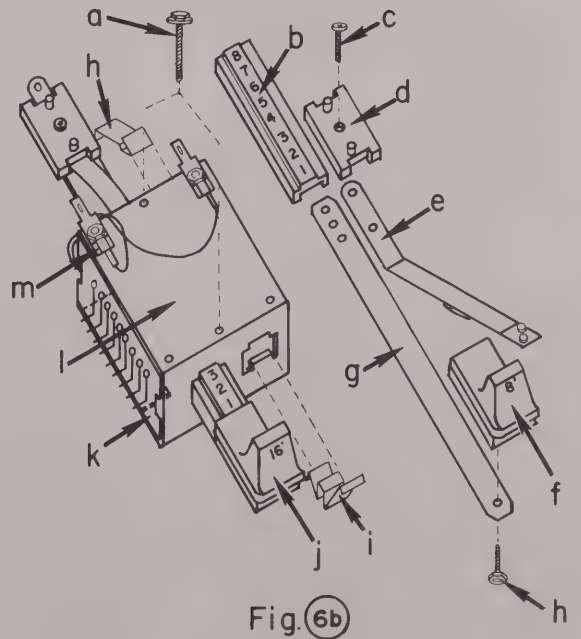
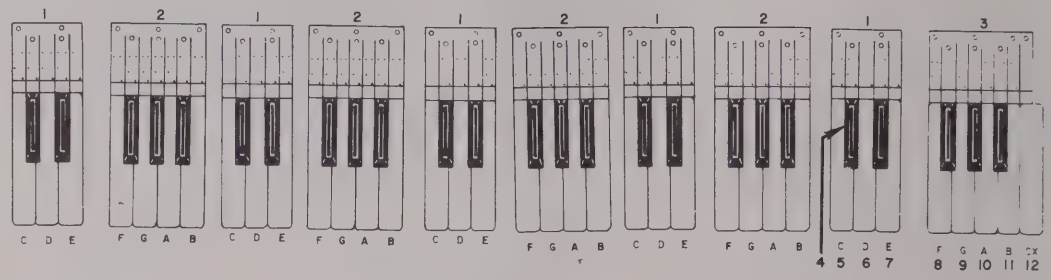


Fig. 6b

(7) UPPER LEFT HAND END BLOCK 050-005036
a SCREWS 885-051138

(8) UPPER KEYBOARD ASSEMBLY (Figure 8a) 119-000096

1	KEY MODULE	(C TO E)	(5 USED)	057-054077-005
2	KEY MODULE	(F TO B)	(4 USED)	057-054076-005
3	KEY MODULE	(F TO CX)	(1 USED)	057-054075-005
4	SHARP KEY	(BLACK)		025-053538
5	C KEY	(IVORY)		025-053543-001
6	D KEY	(IVORY)		025-053544-001
7	E KEY	(IVORY)		025-053545-001
8	F KEY	(IVORY)		025-053546-001
9	G KEY	(IVORY)		025-053547-001
10	A KEY	(IVORY)		025-053548-001
11	B KEY	(IVORY)		025-053549-001
12	CX KEY	(IVORY)		025-053550-001
13	ACTUATOR	(1 PER KEY)		025-047278
14	DOUBLE SIDED TAPE			033-053285
15	PALNUT FASTNER (2 PER KEY)			013-053247
16	KEY CONTACT P.W.B. NO. 3			023-054842
17	KEY CONTACT P.W.B. NO. 2			023-054841
18	KEY CONTACT P.W.B. NO. 1			023-045694-003
19	KEYBOARD EXTRUSION			026-054735
20	UPSTOP FELT			042-045678
21	DOWNSTOP FELT			042-045678
22	KEYBOARD BOLTS			824-123314
23	SPEED NUT			999-046048



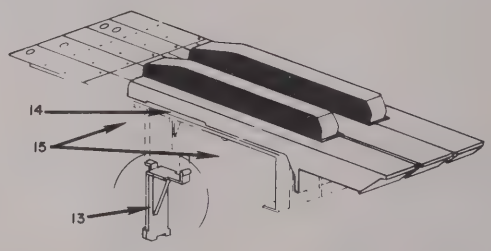
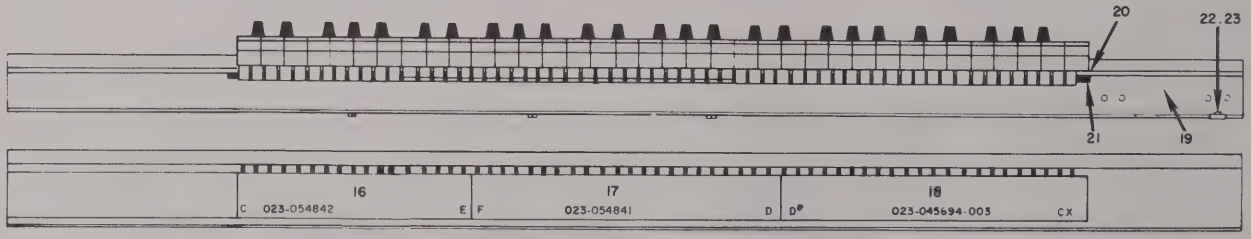


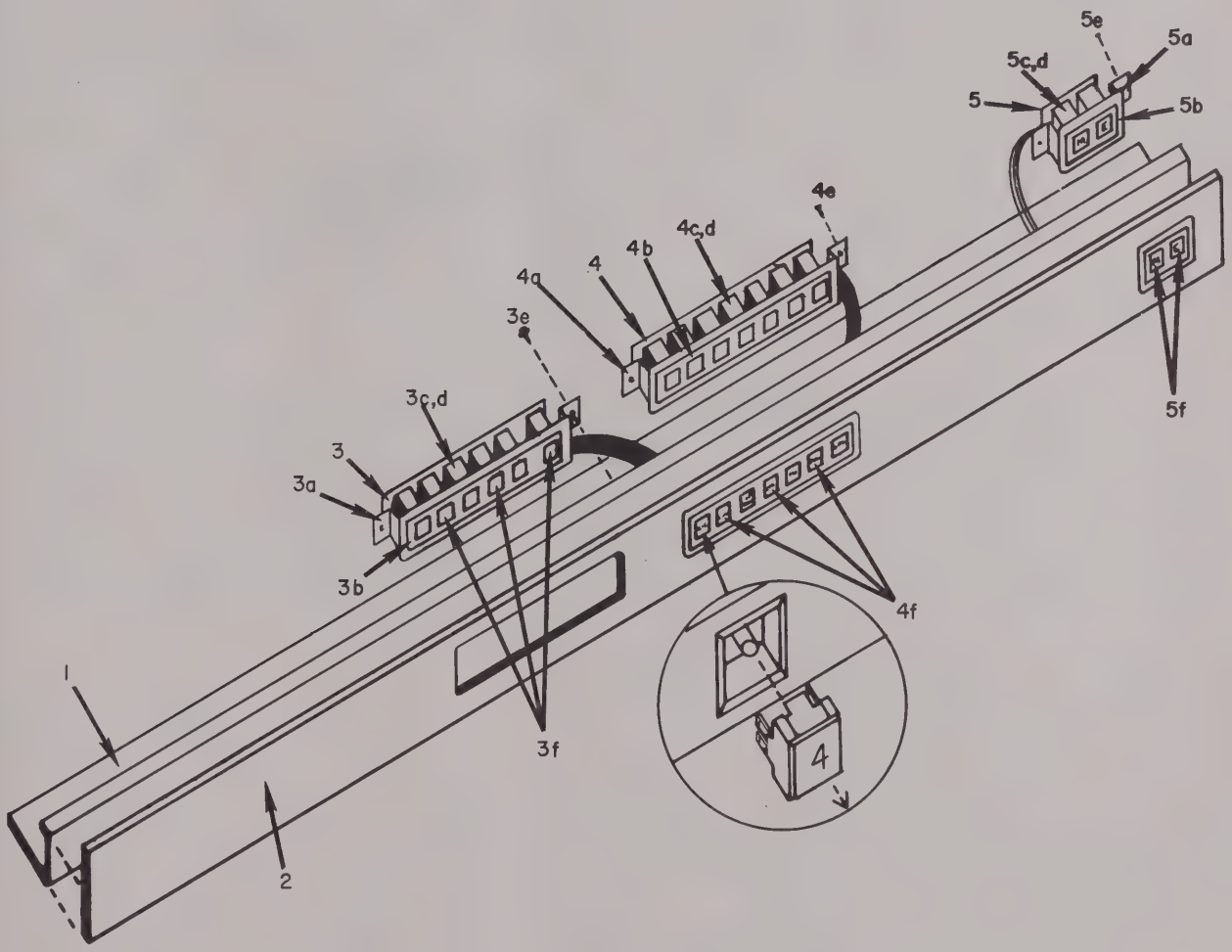
FIGURE (8a)



(9) UPPER RIGHT HAND END BLOCK 050-005036
a SCREWS 885-051138

(10) FRONT STRIP ASSEMBLY 120-000134-001

1	FRONT STRIP CHANNEL		041-056310
2	FACING STRIP		050-005035
3	PISTON SWITCH ASSEMBLY.....		008-055304
a	SWITCH BRACKET		035-054497
b	SWITCH PLATE		055-054503
c	LIGHTED SWITCH (6 USED)		008-054766
d	LAMP GE #18 14V/.040A(5 USED)		016-055886
e	MOUNTING SCREWS		885-050538
f	BUTTONS (STAMPED)	"1"	031-054768-001
		"2".....	031-054768-002
		"3"	031-054768-003
		"4"	031-054768-004
		"5".....	031-054768-005
		"Cancel"	031-054768-006
4	TRANSPOSER SWITCH ASSEMBLY		008-056204
a	SWITCH BRACKET		035-056308
b	SWITCH PLATE		055-056307
c	LIGHTED SWITCH (7 USED)		008-054766
d	LAMP GE #18 14V/.040A(6 USED)		016-055886
e	MOUNTING SCREWS		885-050538
f	BUTTONS (STAMPED)		
		"1" (2 USED)	031-054768-001
		"2" (2 USED)	031-054768-002
		"3"	031-054768-003
		"4"	031-054768-004
		BLACK BUTTON	016-054767-010
5	MAIN ECHO SWITCH ASSEMBLY		008-056736
a	SWITCH BRACKET		035-056726
b	SWITCH PLATE		055-056724
c	LIGHTED SWITCH (2 USED)		008-054766
d	LAMP GE #18 14V/.040A(2 USED)		016-055886
e	MOUNTING SCREWS		885-050538
f	BUTTONS (STAMPED)	"MAIN OFF"	031-054768-025
		"ECHO ON"	031-054768-026

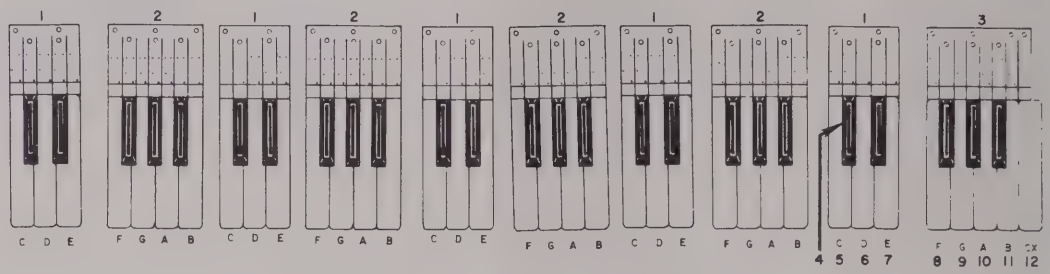


(11) LOWER LEFT HAND END BLOCK 050-005036

a	SCREWS	885-051138

(12)

	LOWER KEYBOARD ASSEMBLY (FIGURE 12a)		119-000097
1	KEY MODULE (C TO E) (5 USED)		057-054077-005
2	KEY MODULE (F TO E) (4 USED)		057-054076-005
3	KEY MODULE (F TO CX) (1 USED)		057-054075-005
4	SHARP KEY (ALL)	(BLACK)	025-053638
5	C KEY	(IVORY)	025-053543-001
6	D KEY	(IVORY)	025-053544-001
7	E KEY	(IVORY)	025-053545-001
8	F KEY	(IVORY)	025-053546-001
9	G KEY	(IVORY)	025-053547-001
10	A KEY	(IVORY)	025-053548-001
11	B KEY	(IVORY)	025-053549-001
12	CX KEY	(IVORY)	025-053550-001
13	ACTUATOR	(1 PER KEY)	025-047278
14	DOUBLE SIDED TAPE		033-053285
15	PALNUT FASTNER (2 PER KEY)		013-053247
16	KEY CONTACT P.W.B. NO. 3		023-054842
17	KEY CONTACT P.W.B. NO. 2		023-054841
18	KEY CONTACT P.W.B. NO. 1		023-045694-003
19	KEYBOARD EXTRUSION		026-054735
20	UPSTOP FELT		042-045678
21	DOWNSTOP FELT		042-045678
22	KEYBOARD BOLTS		827-121814
23	SPEED NUT		999-046048



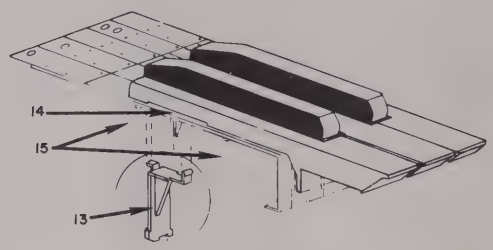
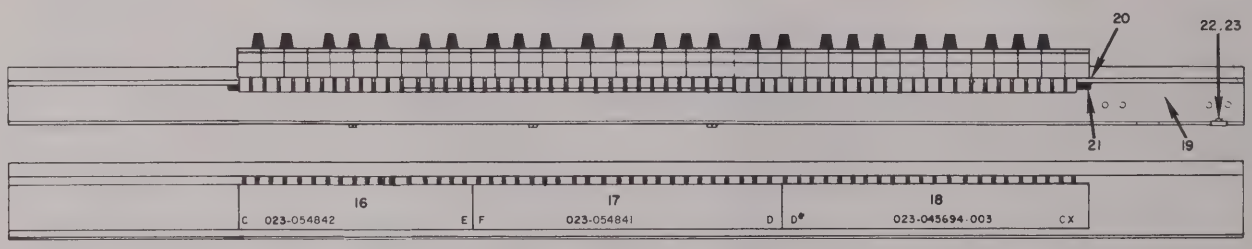


FIGURE (12a)



(13)

	LOWER RIGHT HAND END BLOCK	050-005036
a	SCREWS	885-051138

(14)	PEDAL LIGHT ASSEMBLY (FIGURE 14a)		016-051360
1	LIGHT ADAPTER HOUSING		059-031616
2	SWITCH	.....	008-047882
3	PEDAL LAMP ASSEMBLY NOTE: INCLUDES LENS ASSEMBLY BULB AND SOCKET		016-051357
4	BULB GE #68 13.5V 8W	.....	016-051358

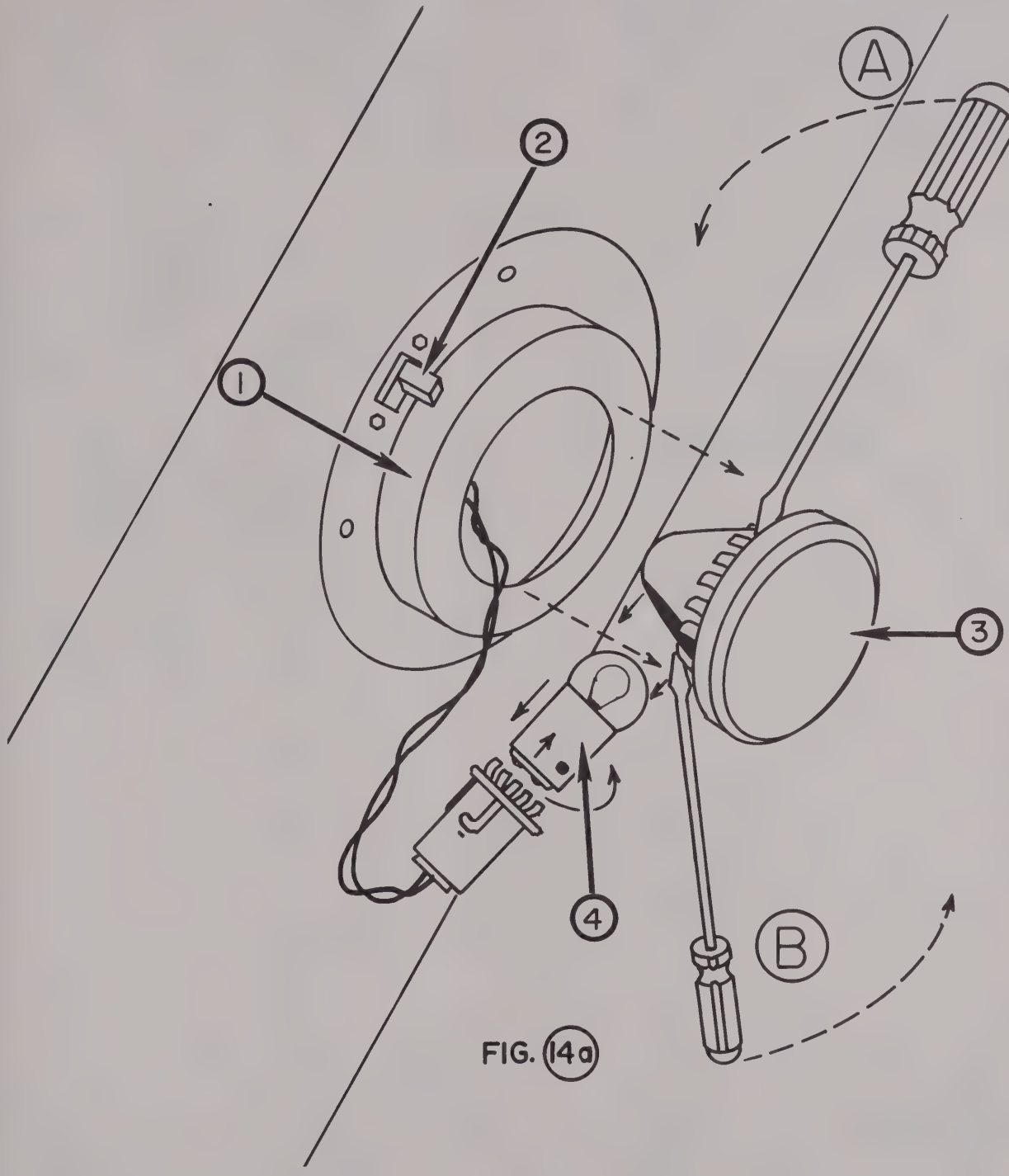


FIG. (14a)

(15)	HEADPHONE JACK	005-049363
(16)	AUXILIARY JACK	005-028532

(17)	EXPRESSION PEDAL (FIGURE 17a)		123-000101
1	PEDAL AND MAT		060-030149
a	RUBER MAT ONLY		043-046347
2	SCREW		833-100518
a	LOCKWASHER		999-000733
b	WASHER		999-000083
3	PEDAL BRACKET ASSEMBLY		060-054701
4	SCREW	(4 USED)	939-050738
5	SCREW	(2 USED)	843-081113
a	LOCKWASHER		999-000729
b	NUT		999-001343
6	CONNECTOR		005-054324
a	CONNECTOR PINS		007-030735
7	DOWNSTOP BUMPER		025-040138
8	BEARING BRACKET (FIGURE 17b)		035-031429
9	BEARING BRACKET (WITH DOWEL)		035-031428
10	PEDAL SHAFT		020-021725
11	EXTENSION SPRING (SHUTTER SPRING)		012-030154
12	PHOTOCELL HOUSING COVER (FIG 17c)		025-032482
13	PHOTOCELL HOUSING BASE		025-032482
14	LAMP SOCKET		004-053160
15	LAMP GE 657 .08A/28V		016-031751
16	DIFFUSER		016-046455
17	SHUTTER		041-043035
18	PHOTOCELL		040-052704
19	SCREW		939-050738

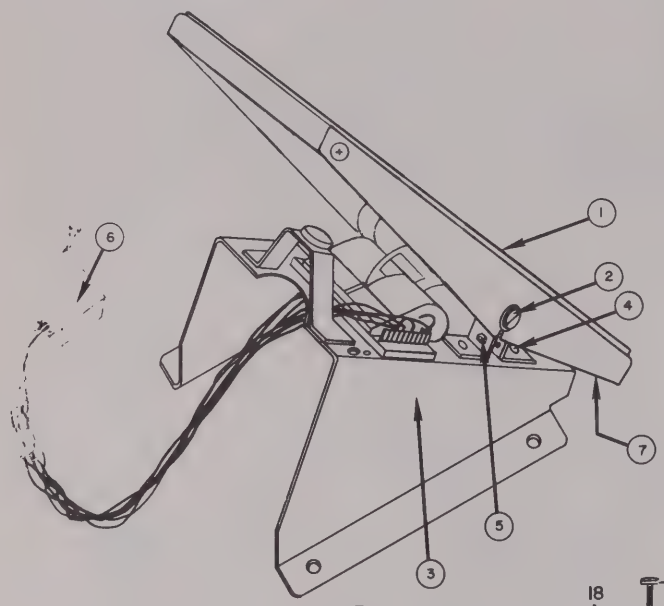


FIG. (17a)

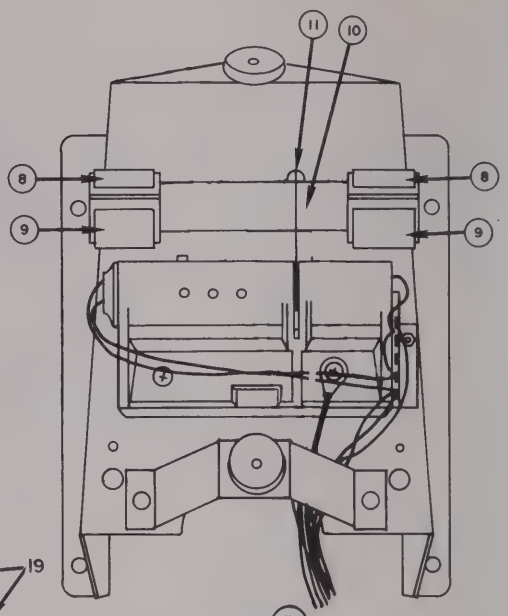


FIG. (17b)

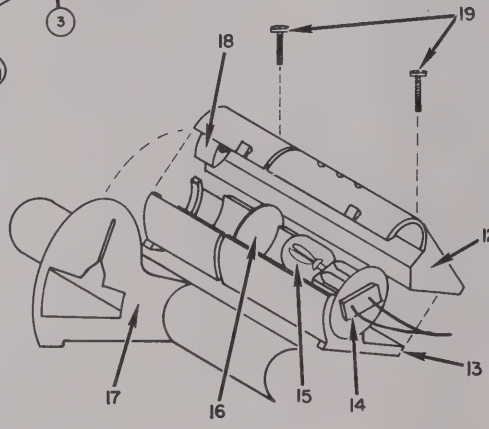


FIG. (17c)

(18)	SPEAKER 6 1/2" (MAIN)		014-045827
(19)	SPEAKER 15" (MAIN)		014-046438
1	SPEAKER MOUNTING NUTS		999-001437
(20)	POWER TRANSFORMER ASSEMBLY	120V/60 HZ	003-055539
		220V/50 HZ	003-055540
(21)	LIGHT TRANSFORMER ASSEMBLY		003-055541
(22)	MOUNTING BRACKET		035-055114
1	11 PIN RECEPTACLE		004-050601
2	LINE CORD (DOMESTIC)		011-056446
	(EXPORT)		011-054803
3	GROMMET		043-056501
4	BARRIER (EXPORT ONLY)		016-054825-003
(23)	REVERB ASSEMBLY WITH P.W.B.		121-000214
1	REVERB UNIT ONLY		121-000213
2	REVERB AMP P.W.B.		124-000522
3	GROMMET (4 USED)		043-023844
4	EYELET (4 USED)		999-023845
(24)	EXPRESSION PEDAL HOUSING		046-054758
(25)	AMPLIFIER ASSEMBLY		126-000132
1	MOUNTING BRACKETS	(2 USED)	041-054759
2	AMP MODULES	(2 USED)	063-045034
a.	HEAT SINKS	(2 PER MODULE)	026-045505
b.	INSULATOR WASHER	(6 PER MODULE)	036-032018
c.	MOUNTING SPACER	(4 PER MODULE)	044-050580
d.	P.W.B.	(1 PER MODULE)	124-000169
(26)	KEYBOARD SUPPORT BRACKET (RIGHT HAND)		035-045690
	(LEFT HAND)		035-045689
(27)	STOP BLOCK (2 USED)		050-004280
a.	SCREWS		885-071838
(28)	SUPPORT ANGLE		035-055781
(29)	CONTROL RAIL SUPPORT BLOCKS (2 USED)		050-005037
a	SCREWS		885-071838

(30) BACK PANEL 050-004959
- a SCREWS 882-082031
- b WASHERS 999-000413

(31) TREMOLO MOUNTING BLOCKS
- a FRONT 050-004726
  - i SCREWS 827-102718
- b RIGHT..... 050-004728
  - i ANGLE BRACKET 041-051365
  - ii SCREWS 827-103618
- c LEFT 050-004727
  - i ANGLE BRACKET 041-051365
  - ii SCREWS..... 827-103618

(32) ROTARY TREMOLO UNIT (COMPLETE ASSEMBLY) (FIG. 32a & 32b)

DOMESTIC	120V/60HZ	121-000212-001
EXPORT	115V/50HZ	121-000212-002

NOTE:
COMPLETE ASSEMBLIES TO BE ORDERED THROUGH HAMMOND ORGAN SERVICE DEPT.

ASSEMBLY PARTS TO BE ORDERED THROUGH
LESLIE SERVICE DEPARTMENT
TOLL FREE: 800/621-8345 (OUTSIDE ILLINOIS)
OR 312/283-3361 (ILLINOIS ONLY)

OR ELECTRO MUSIC
ACCUTRONICS, INC.
11700 COPENHAGEN COURT
FRANKLIN PARK, IL 60131

1	SCREW	589-112350
2	BEARING ASSEMBLY	560-051102
3	SCREW	589-110200
4	WASHER (LWDO)	589-026328
5	WASHER (FW)	589-026633
6	BUSHING (SHOULDER)	517-050633
7	MOTOR ASSEMBLY (2 SPEED 117V/60CY)	521-141823
	EXPORT (2 SPEED 117V/50CY)	521-141824
8	WASHER (FW)	589-026633
9	WASHER (LWI).....	589-028019
10	WING NUT	589-050625
11	GROMMET	543-051326
12	WASHER (FW)	589-051342
13	BEARING ASSEMBLY	560-051102
14	SCRE.....	589-112350
15	BRACKET (PROTECTIVE)	515-052456
16	CABLE ASSEMBLY	511-141825
17	SCREW	589-112140
18	MERCOTAC	505-015941
19	SPEAKER.....	514-043125
20	DRUM	525-139397
21	SHAFT AND PULLY ASSEMBLY	522-052548
22	BELT (DOMESTIC 60 CY)	522-011700
	(EXPORT 50 CY)	522-030601
23	WOODWORK ENCLOSURE.....	572-052290
24	BRACKET (Z)	535-050658
25	GROMMET	543-050641
26	MOTOR D10 (117V 50/60CY)	521-014019
27	SCREW	589-107670
28	WHEEL.....(RIM DRIVE).....	560-014027
29	SCREW	589-026666
30	MOTOR & SHIELD ASY (117V/60CY)	521-053827
31	CONTACT (INSERT MALE)	505-023309
32	HOUSING PLUG (6 CKT)	505-023259
33	BRACKET (U).....	535-014035
34	RING (C)	513-050666
35	PULLEY (DOMESTIC 60 CY)	522-024307
	(EXPORT 50 CY)	522-026740
36	SCREW	589-026740

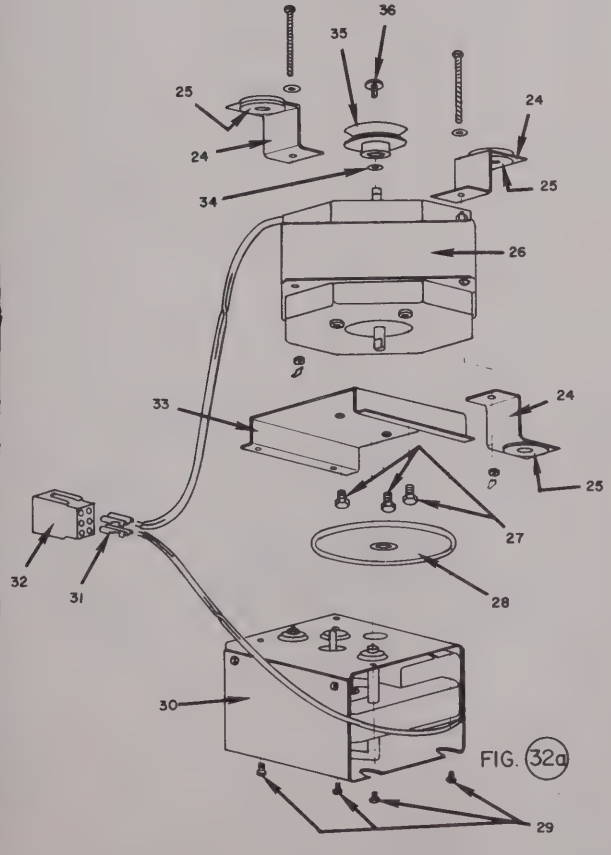


FIG. 32a

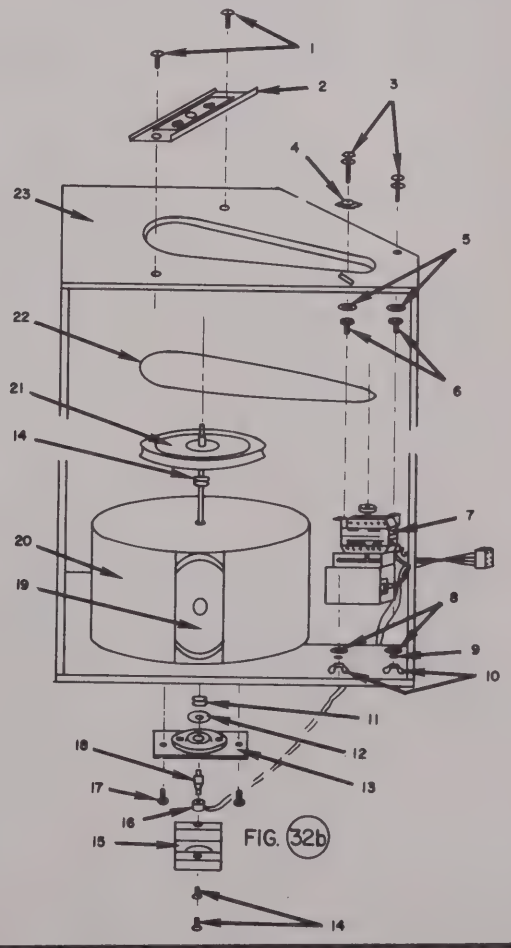


FIG. 32b

(169)

35 Watt Power Amp P.W.B. 124-000169

Transistor	Q1,2	001-021101
	Q5	001-021240
	Q3	001-022040
	Q4	001-022050
	Q6,7 (Mounted in Heat Sinks)	001-021270
Diodes	D1-8	001-226080
Capacitor (Electrolytic)		
	C1,3 4.7MFD/50 V	431-056509
	C6 100 MFD/50 V	431-107509
	C4, C7 47 MFD/25V	432-506259

(517)

TRANSPOSER P.W.B. 124-000517

Diodes	D1-7	001-226080
9 Circuit Connector	J513A	005-044729
6 Circuit Connector	J514A	005-044733
6 Circuit Wafer Molex	J542	005-044742
4 Circuit Connector Molex	J543	005-051169
3 Circuit Connector Molex	J542	005-051170
Integrated Circuit	IC 4	075-004040
	IC 3	075-004046
	IC 1,2	075-004001-RCA
Capacitor, Monolithic .22 MFD		438-210292

(521)

DEMULTIPLEX P.W.B. 124-000521

Transistor	Q15-17	001-021260
	Q 1-14	001-022114
Diodes (Signal)		001-226080
Connector Terminal Assembly	J512A	005-044729
6 Circuit Wafer Molex	J556,557,558,559	005-044742
6 Circuit Connector Molex	J559	005-051168
4 Circuit Connector Molex	J555, 580	005-051169
3 Circuit Connector Molex	J556,557,558	005-051170
Integrated Circuit	IC 1 - 4	075-004052
Capacitor (Electrolytic)		
	C 45 200MFD/35V	431-207359
	C 44 470MFD/35V	431-507359
	C 1-7 470MFD/6.3V	432-507069
Resistor, Trimmer Pot	5 K R 24	676-000061

(522)

REVERB PWB 124-000522

Transistors	Q 2, 3, 7	001-021133
	Q 5	001-021232
	Q 1, 6	001-021260
	Q 4	001-022032
Diodes (Signal)		001-226080
6 Circuit Wafer Molex	J9	005-044742
3 Circuit Connector Molex	J9	005-051170
Capacitor (Electrolytic)		
	C 11 4.7 MFD/50V	431-056509
	C 4 100 MFD/35V	431-107259
	C 6 200 MFD/35V	431-207359
	C 3 10 MFD/50V	432-106509
Resistor, Trimmer Pot	5K R24	676-000061

(591)

MULTIPLEX P.W.B. 124-000591

Transistor	Q1-9	001-022114
Diodes	D1-12	001-226080
Connector & Terminal Assembly	J528,529	005-044729
12 Circuit Wafer Molex	J567	005-044738
15 Circuit Wafer Molex	J566,699,712	005-044743
9 Circuit Wafer Molex	J704,707	005-053400
Integrated Circuit	IC 1-8	076-004052-RCA
Capacitor, Electrolytic		
	100 MFD/25V C64	431-107259
Capacitor, Tantalum		
	4.7 MFD/35V C57,62,63	435-475354

(595)

LOGIC PWB 124-000595

Transistor	Q13-15	001-021134
	Q3, 6, 9, 12	001-021314
	Q1, 2, 4, 5, 7, 8, 10, 11	001-022114
Diodes	D1, 2	001-226080
9 Circuit Wafer Molex	J690	005-044532
12 Circuit Wafer Molex	J692	005-044738
6 Circuit Wafer Molex	J712	005-044742
15 Circuit Wafer Molex	J693	005-044743
4 Circuit Connector Molex	J691	005-051169
Integrated Circuit	IC 7	075-004069
	IC 3	075-004071
	IC 2	075-004514
	IC 1	075-004520
	IC 11	076-004001-RCA
	IC 8,9, 10	076-004011-RCA
	IC 4,5	076-004012-RCA
	IC 6	076-004023-RCA
Capacitor, Tantalum 10MFD/25V	C3	414-040152
Capacitor, Electrolytic 100 MFD/25V	C1	432-107259
Trimmer Pot 50K	R2	676-000089

(618) (620) POWER SUPPLY PWB

	Domestic	124-000618
	Export	124-000620
Transistor	Q7	001-021100
	Q1	001-021134
	Q3, Q5	001-021232
	Q8	001-021240
	Q2, Q4	001-021314
	Q6	001-021320
Diodes, Signal,	D7 - D9	001-226080
Rectifier,	D1 - D6, D10 - D13	001-024061
Triacs	TR1, TR2	001-028011
9 Circuit Wafer	Molex J648	005-044532
6 Circuit Wafer	Molex J644, 646, 647	005-004742
15 Circuit Wafer	Molex J653, 649	005-044743
6 Circuit Connector	Molex J645,650,644	005-051168
4 Circuit Connector	Molex J678, 651, 654, 655, 656, 657, 652	005-051169
3 Circuit Connector	Molex J644, 646,648	005-051170
Plug Terminal Assembly	J641	005-054756
Receptacle & Terminal Assy.	J640	005-055428
Receptacle & Terminal Assy.	J643	005-055624
Capacitor Clamp		013-049317
Fuse Clip	Domestic	013-050528
	Export	013-050529
Fuse F3, F4	Domestic 1.5 Amp	016-040425
	Export 1.6 Amp	016-050605
Fuse F1, F2	Domestic 3 Amp	016-050541
	Export 3.15 Amp	016-050608
Fuse F6	Domestic 2 Amp	016-039507
	Export 2 Amp	016-050606
Fuse F5	Domestic 5 Amp	016-050548
	Export 5 Amp	016-050610
Thermister		016-055741
Photocoupler		040-049496
Heat Sink	4 used	041-054100
Integrated Circuits	IC 3	075-017912
	IC 4	075-017915
	IC 1	075-017924
	IC 2	075-027824
Capacitor (Tantalum)		
	C8 .1 MFD/35V	914-250012
	C5, C12 1 MFD 25V	414-250092
Capacitor C1	(Domestic) .01	415-110011
	(Export) .01	439-120051
Capacitor (Electrolytic)		
	C4, 7, 11 22 MFD/50V	432-256509
	C15 20/22 MFD/25V	433-206253
	C14 200 MFD 25V	433-207253
	C13 4700/5000 MFD/25V	434-508259
	C3,6,10 4000 MFD/50V	450-010085
Resistor	R25, 26 12K, 2W	600-040751
	R39 5K, 5W	601-160051
	R31 68 Ohm, 3W	602-050021

652 GENERATOR P.W.B. 124-000652

TRANSISTOR	Q8	001-021173
	Q6,7	001-021310
DIODE, SIGNAL, ALL		001-226080
COIL	L1	003-051656
40 PIN SOCKET	4 USED	004-046770
16 PIN SOCKET		004-050501
9 CIRCUIT WAFER MOLEX J617, 597		005-044532
12 CIRCUIT WAFER MOLEX J618,616,615,	614,613,612	005-044738
6 CIRCUIT CONNECTOR MOLEX J609,622,	605, 602	005-051168
4 CIRCUIT CONNECTOR MOLEX J610,608,602,	604,594,607, 606, 600, 603, 601	005-051169
9 CIRCUIT WAFER MOLEX	J512	005-054216-003
12 CIRCUIT WAFER MOLEX	J513	005-054744
15 CIRCUIT WAFER MOLEX	J514	005-054745
INTEGRATED CIRCUIT	IC5	075-000220
	IC 1-4	075-000440
SUSTAIN COUPLATE P.W.B. (58 USED)		124-000715
PERCUSSION B COUPLATE P.W.B.(12 USED)		124-000719
PERCUSSION A COUPLATE P.W.B.(9 USED)		124-000720
CAPACITOR, TANTALUM	C31 4.7MFD/25V	414-240132
CAPACITOR, ELECTROLYTIC		
	C28 10 MFD/50V	432-106509
	C29 2000/2200 MFD/15V	434-208159

653

SINE FILTER P.W.B. 124-000653

TRANSISTOR Q1-8		001-021261
9 CIRCUIT WAFER MOLEX		005-044532
CAPACITOR, ELECTROLYTIC	C69 4.7 MFD/50V	431-056509
CAPACITOR MONOLITHIC	C71 .047MFD	438-210213
	C1 .15 MFD	438-210272
	C9 .22 MFD	438-210292
	C65 27 PFD	440-210062
	C56 82 PFD	440-210122
	C46 120 PFD	440-210142
	C10, 636 220 PFD	440-210172
	C27 330 PFD	440-210192
	C70 470 PFD	440-210212
	C18 560 PFD	440-210222
	C8 820 PFD	440-210242
C60, 61, 62, 63, 64, 68	.001 MFD	440-210252
C51, 52, 53, 54, 55	.0027 MFD	440-210302
C41, 42, 43, 44, 45, 59, 67	.0039 MFD	440-210322
	C58 4700 PFD	440-210332
C31, 32, 33, 34, 35, 50, 66	.0068 MFD	440-210352
	C57 8200 PFD	440-210362
C22, 23, 24, 25, 26, 37, 39, 40, 49	.012 MFD	440-210382
	C30, 48 .015 MFD	440-210392
C13, 14, 15, 16, 17, 28, 29, 38	.022 MFD	440-210412
	C19 .027 MFD	440-210422
C3, 4, 5, 6, 7, 21, 47	.033 MFD	440-210432
C2, 12, 20	.047 MFD	440-210452
	C11 .068 MFD	440-210472

654 UPPER KEYBOARD VOICE P.W.B. 124-000654

TRANSISTOR Q1		001-022103
DIODE, SIGNAL (ALL)		001-226080
12 CIRCUIT WAFER MOLEX J862, 863		005-044738
BUS BAR (12 USED)		029-053704
CONTACT WIRE (12 USED)		030-053705
INTEGRATED CIRCUIT	IC 3	075-000090
	IC 4, 5, 7, 9, 10, 12	075-000324
	IC 13	075-003280
	IC 6, 8, 11	075-004016
	IC 1, 2	075-004025
CAPACITOR, ELECTROLYTIC,		
	C1, C17,19,20 4.7 MFD/50V	431-056509
	C43,44 ,46 100 MFD/25V	432-107259
RESISTOR, TRIMMER POT,	R39 5K	676-000061
	R90, 95 100K	676-000073

655 LOWER KEYBOARD VOICING P.W.B. 124-000655

DIODE, SIGNAL, (ALL)		001-226080
18 CIRCUIT WAFER MOLEX	J 850, 851	005-044537
6 CIRCUIT WAFER MOLEX	J 852	005-044742
BUS BAR	9 USED	029-053704
CONTACT WIRE	9 USED	030-053705
INTEGRATED CIRCUIT	IC 6	075-000090
	IC 2, 4, 5, 8, 11	075-000324
	IC 7	075-003280
	IC 1	075-004011
	IC 6, 9, 10	075-004016
CAPACITOR, ELECTROLYTIC,		
	C 21, 22, 29, 34, 45 4.7 MFD/50V	431-056509
	C 26, 27, 28 100 MFD/25V	432-107259
	C 23 1 MFD/50 V	443-105502
RESISTOR, TRIMMER POT,	R22 10K	676-000064
	R81 50K	676-000069
	R109 100K	676-000073

661 STAIRSTEP PEDAL P.W.B. 124-000661

DIODE, SIGNAL (ALL)		001-226080
9 CIRCUIT WAFER MOLEX	J153	005-044532
18 CIRCUIT WAFER MOLEX	J859, 860	005-044537
4 CIRCUIT CONNECTOR MOLEX	J861	005-051169
INTEGRATED CIRCUIT	IC 4	075-000090
	IC 1,2,6,7,8,9	075-000324
	IC 3	075-003280
	IC 5	075-004066
CAPACITOR, ELECTROLYTIC,		
	C47,48,49 4.7 MFD/50 V	431-056509
	C10, C17 100 MFD/25V	432-107259

662 PRESET P.W.B. 124-000662

TRANSISTOR	Q8, 10-6	001-021314
	Q1-7, 9	001-022114
DIODE, SIGNAL (ALL)		001-226080
9 CIRCUIT WAFER MOLEX	J92	005-044532
10 CIRCUIT WAFER MOLEX	J853	005-044536
18 CIRCUIT WAFER MOLEX	J855	005-044537
12 CIRCUIT WAFER MOLEX	J853, 857	005-044738
15 CIRCUIT WAFER MOLEX	J854	005-044743
9 CIRCUIT WAFER MOLEX	J858,859	005-054216-003
PRINTED NETWORK	RN1, RN2	058-053000
INTEGRATED CIRCUIT	IC 1,2,3,6,7,11	075-000324
	IC4,5,8,9	075-004011
	IC 10	076-004051-RCA
CAPACITOR, ELECTROLYTIC		
	C5 100 MFD/25V	431-107259

(663) CONTROL PANEL MIXER P.W.B. 124-000663

TRANSISTOR	Q2	001-021260
	Q1	001-022100
DIODE, ZENER, D12 15V1W		001-023028
DIODE, SIGNAL		001-226080
10 CIRCUIT WAFER MOLEX	J866	005-044536
18 CIRCUIT WAFER MOLEX	J864	005-044537
12 CIRCUIT WAFER MOLEX	J866	005-044738
4 CIRCUIT WAFER MOLEX	J867	005-044744
BUS BAR	11 USED	029-053704
CONTACT WIRE	11 USED	030-053705
INTEGRATED CIRCUIT	IC7, 14	075-000324
	IC 5	075-000512
	IC 13	075-003280
	IC 1 - 3	075-004011
	IC 4,9,10,11,15	075-004016
	IC 8	075-004025
	IC 6	075-004046
	IC12,16,17	075-004156
CAPACITOR, ELECTROLYTIC,		
	C 18 10 MFD/50V	431-106509
	C57,58 100MFD/50V	431-107259
	C64 470MFD/35V	431-507359
	C8,20,43 100MFD/15V	432-107159
	C7,51 100 MFD/25V	432-107259
	C10,11,58 1 MFD/50V	442-105502
	C14,15,44 .47MFD/50V	442-474502
	C4 4.7MFD/50V	442-475252
CAPACITOR, TANTALUM,		
	C31,34,37 1.0MFD/35V	435-105354
	C6 4.7MFD/35V	435-475354
CAPACITOR, MONOLITHIC,		
	C33,38,39,40 .10MFD	438-210252
	C19,26,28 .15MFD	438-210272
	C21,22,41,42,50 .22MFD	438-210292
	C29,52,53 .01MFD	440-200372
	C24,32,35,36,45,46 100PFD	440-210132
	C27 220PFD	440-210172
	C47,48 .001MFD	440-210252
	C55,56 .015MFD	440-210392
	C60,61,63 .022MFD	440-210412
	C17 .056MFD	440-210462
	C62 .082MFD	440-210482
	C16,23 820 PFD	441-200242
RESISTOR, TRIMMER POT, R51,107 20K		676-000065
	R15 50K	676-000069
	R35,61,62 100K	676-000073
	R162,176 250K	676-000077

(667) CHIMES P.W.B. 124-000667

TRANSISTOR	Q1, 2	001-021172
DIODE, SIGNAL	(ALL)	001-226080
9 CIRCUIT WAFER MOLEX	J201,203	005-044532
12 CIRCUIT WAFER MOLEX	J206,207	005-044738

(715) SUSTAIN COUPLATE PWB 124-000715

Transistor	Q1 - 3	001-022103
Diode (Signal)	D1-15	001-226080
Plug Button		025-053152
Capacitor	C1-3 .22 MFD	438-210292

(719) PERC B COUPLATE PWB 124-000719

Transistor	Q-3	001-022103
Diode (Signal)	D1-16	001-226080
Plug Button		025-053152
Capacitor		
	C4 .015 MFD	438-210152
	C5 .022 MFD	438-210172
	C6 .033 MFD	438-210192
	C3 .068 MFD	438-210232
	C2 .10 MFD	438-210252
	C1 .15 MFD	438-210272

(720) PERC A COUPLATE PWB 124-000720

Transistor	Q-3	001-022103
Diode (Signal)	D1-16	001-226080
Plug Button		025-053152
Capacitor		
	C4 - 6 .047 MFD	438-210212
	C1 - 3 .22 MFD	438-210292

(723) MAIN ECHO P.W.B. 124-000723

Transistor	Q1, 2	001-022114
Diode, Zener,	D2 14V 1W	001-223026
12 Circuit Wafer Molex	J726	005-044738
6 Circuit Wafer Molex		005-044742
Integrated Circuit	IC4	075-000324
	IC6	075-004011
	IC2,3,5	075-004016
	IC1	075-004156

Capacitor, Electrolytic		
	C13 10 MFD/50 V	432-106509
	C17, 20 100 MFD/15V	432-107159
	C21 22 MFD/50V	432-256509
	C1, 4, 7, 10 1 MFD/50V	442-105502
Capacitor, Monolithic		
	C14, 15, 19 .01 MFD	438-210132
	C2, 3, 5, 6, 8, 9, 11, 12 .22 MFD	438-210292

SECTION VII
APPENDIX

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